AMF

82-70

BASIC PINSPOTTER INSTRUCTION

AMF BOWLING, INC.
RICHMOND, VIRGINIA 23227

610007027

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AMF BOWLING, INC.
TRAINING SCHOOL

The following precautionary rules have been instituted to insure the safety of all trainees attending our training program and must be strictly adhered to. Any deviation could possibly result in a serious or fatal injury to either you or your fellow students. The general practice of these rules will also be very beneficial to you in the course of your work in the future.

DO NOT:

1) Enter machine while power is on.
2) Operate machine before replacing all guards.
3) Crank motors with motor plug in.
4) Extend any part of the body under, over, or around any guard while the machine is in operation.
5) Involve in horseplay or practical jokes in the vicinity of the machine.
6) Touch or handle wiring while Russell & Stoll plug is in (electrical shock can be fatal).
7) Operate any switches until checking to be sure all personnel are clear of machine.

DO:

1) Question the instructor if in doubt of safety procedure.
2) Wear proper clothing and shoes.
3) Use the proper tools for the job.
4) Check to see if all cranks are off of the machine.
5) Turn off masking switch before entering the machine from the front.
6) Turn off pin elevator, table and sweep switches when entering machine from rear.
7) Pull Russell & Stoll plug before using the continuity tester.

I acknowledge that there is an inherent danger in any training or instruction program involving mechanical equipment. I assume the risk associated with my participation in AMF's training and instruction program. I acknowledge that I am covered by health and medical insurance provided by my employer and by workman's compensation insurance which will cover and protect me from injury or loss resulting from any physical injury sustained by me during the course of instruction and training. My employer and I agree to indemnify AMF from and against any loss liability arising from any injury to person or property during the course of my participation in or arising out of my participation in AMF's instruction and training program. I (student) further certify that I have received instructions regarding pinspotter operation and safety procedures, and they are fully understood by me.

_____
Student Signature

_____
Print Name Date

AMF BOWLING, INC.
FIELD TRAINING PROGRAM

MATERIAL COVERED IN CLASS

HOW TO:

1. Remove power and motor plugs
2. Use a pin hook
3. Remove dead wood
4. Clear an off spot pin
5. Clear the ball exit
6. Use a motor crank
7. Clear interlock
8. Open respot cells
9. Clear a pin pile-up
10. Remove pins jammed in table
11. Make pin set-ups
12. Change a circuit board
13. Change a chassis
14. Zero machine and chassis
15. Fill out a trouble call sheet
16. Machine cleaning
17. Safety procedures
18. Ball returns
19. Foul detectors
20. Underline ball calls

This is to verify that I, _____,
(Student Name)

from_____,
(Establishment)

have received instructions on machine operation and safety procedure. I have also been instructed in the proper procedure in clearing the problems listed above.

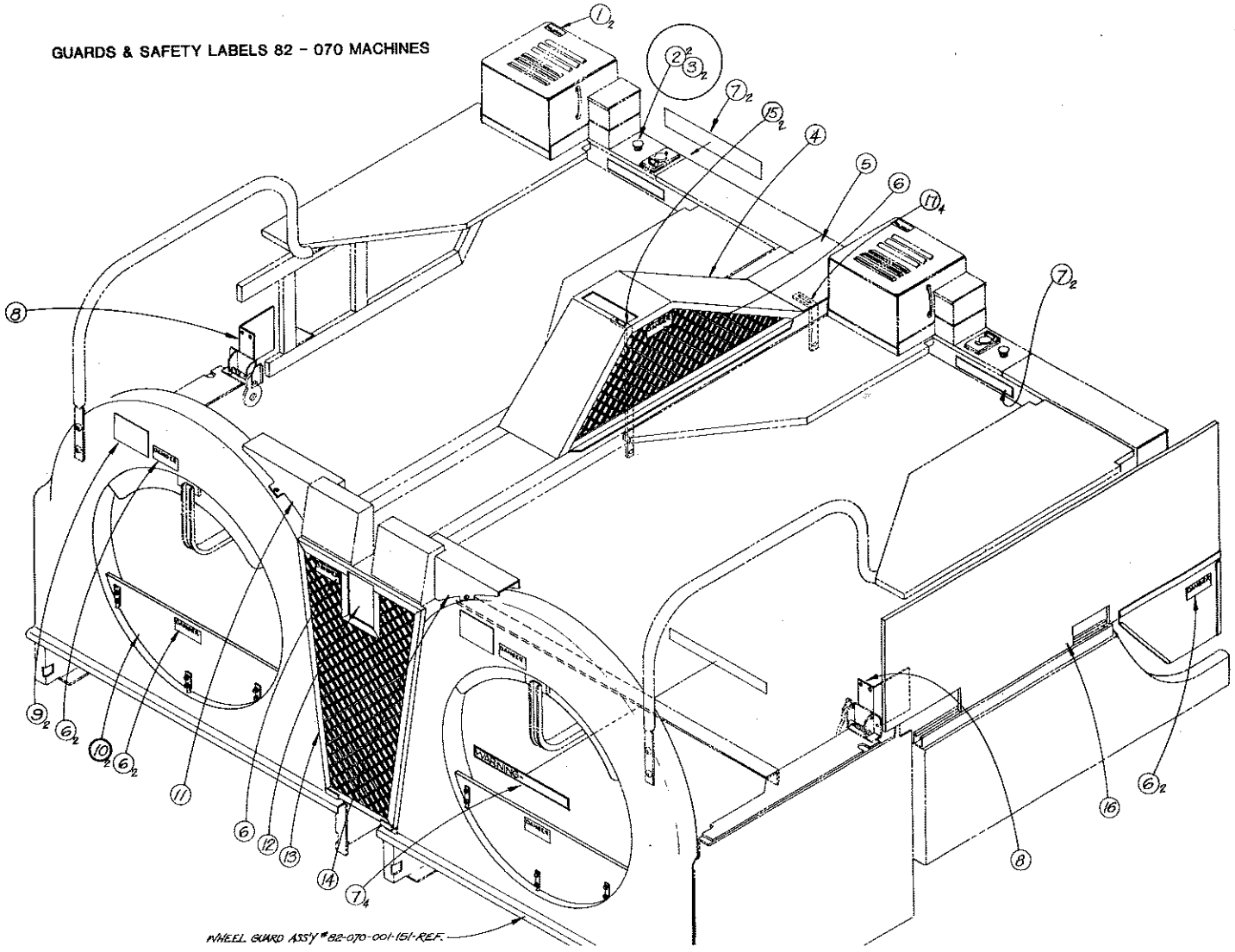
Instructor_____ Date _____

NOTES

20 SAFETY TIPS FOR MECHANICS

1. Remove the power plug before working on a pinspotter or associated equipment. Never work on a machine while it's in operation.
2. Be sure all safety guards are securely in place before operating a pinspotter.
3. Do not extend any part of the body under, over or around any guard while the machine is in operation.
4. Do not touch or handle any machine wiring while the power plug is in. Electrical shock can be fatal.
5. Do not crank motors with the motor plug in.
6. Turn off the mask switch when working on the front end of the machine.
7. Turn off the pin elevator, table and sweep switches when working on the rear of the machine.
8. Be aware of the danger of springs under tension.
9. Crank the sweep to the guard position when working in the machine.
10. Wear proper clothing. When working around machinery it's an invitation to disaster to wear gloves, long sleeves, pants with cuffs, loose clothing or jewelry.
11. Wear sturdy shoes and keep the laces tied. Don't forget eye protection, ear protection and a dust mask, depending on the work you're doing.
12. Don't be a "jackknife mechanic." Use the right tool for the job. Don't expect a small tool to do the job of a heavy duty tool.
13. Know your tools. Learn how to use them and respect their limitations.
14. All electric power tools should be grounded or double insulated. Stand on a rubber mat when operating fixed electrical equipment.
15. Don't carry plugged-in or cordless power tools with your finger on the switch.
16. Do not use power tools with which you're not familiar. Don't fake it. If you're not sure, get instructions from a more knowledgeable operator.
17. Keep the pinspotter area and workshop clean at all times.
18. Don't smoke in the pinspotter area.
19. Know the location of all fire extinguishers and how to use them.
20. Post emergency phone numbers near the back end phone.

GUARDS & SAFETY LABELS 82-070 MACHINES



GUARDS & SAFETY LABELS 82-070 MACHINES

	ITEM	PART NUMBER	DESCRIPTION
	1	070-007-646	Caution Decal (Chassis Lid)
(Not on all machines)	2	746-605-011	Contact Block
	3	759-517-051	Palm Button Safely Switch Operator Housing
	4	070-011-401	Ball Lift Guard WLD.
	5	070-004-713	Cover Guard Assembly
	6	070-011-211	Danger Decal
	7	070-005-614	Warning Decal
	8	070-004-738	(Toe) Guard

ITEM	PART NUMBER	DESCRIPTION
9	070-011-409	Safely Guard Plate
10	000-022-219	Pin Elevator Guard Assembly
11	070-011-393	L.H. Belt Guard
12	000-024-694	Filler Plate
13	070-004-690	B.E. Guard
14	070-011-392	R.H. Belt Guard
15	070-010-238	Bracket Front
16	070-005-585	Guard Assembly End Machine
17	070-004-691	Bracket Rear

PINSPOTTER MECHANICAL OPERATIONS

FOUR BASIC PINSPOTTER FUNCTIONS

The 8270 Pinspotter has four basic functions:

1. Stop balls
2. Return balls
3. Spot pins
4. Respot pins

FIVE BASIC PINSPOTTER CYCLES

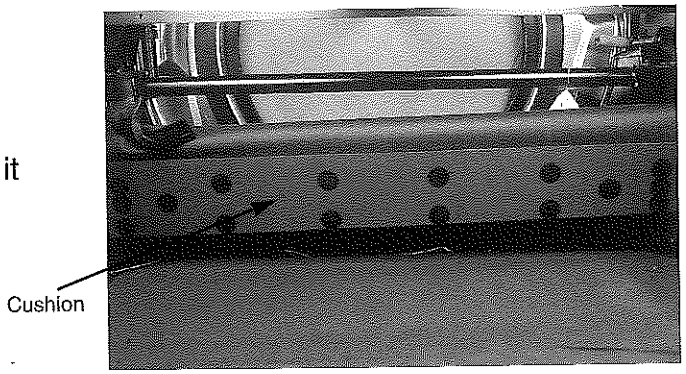
The 8270 Pinspotter employs five basic cycles:

1. First Ball Cycle
2. Second Ball Cycle
3. Strike Cycle
4. First Ball Foul Cycle
5. Second Ball Foul Cycle

EIGHT BASIC PINSPOTTER COMPONENTS

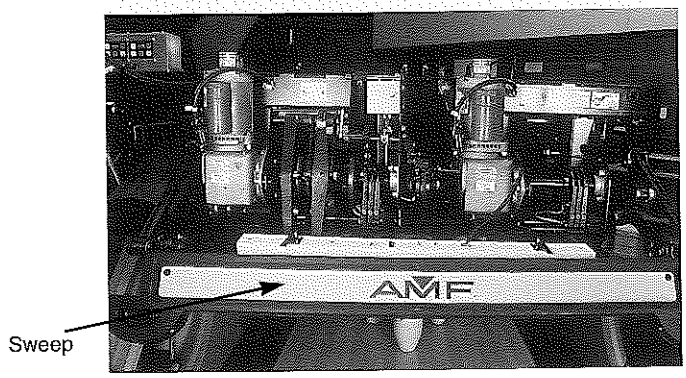
1. Cushion

The cushion stops the ball and deflects it into the pit area.



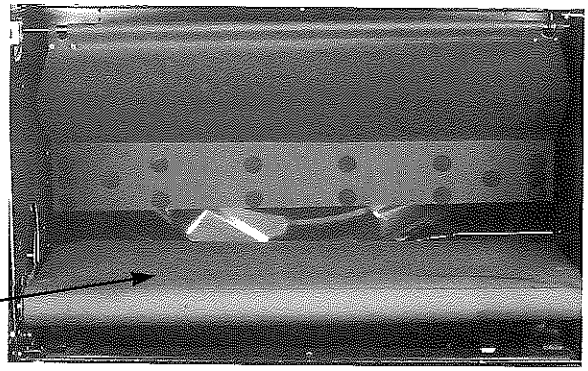
2. Sweep

The primary function of the sweep is to remove fallen pins from the lane. It also is a guard and prevents balls from striking the table while spotting or respotting pins.



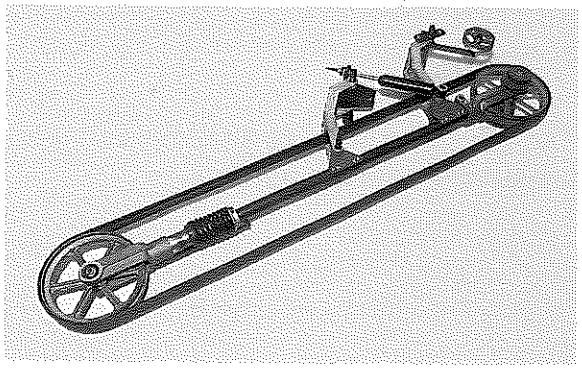
3. Carpet and Pit

The carpet is a belt which carries fallen pins to the pin elevator wheel, where they are elevated to the distributor. The underlaying pit provides support for the pins and guides the ball to the opening of the ball return.



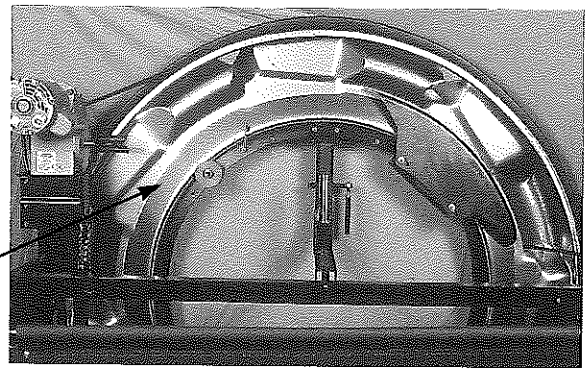
4. Ball Lift

The ball lift carries the ball from the machine high enough to permit a gravity return. The ball lift is mounted in the middle of a pair of machines.



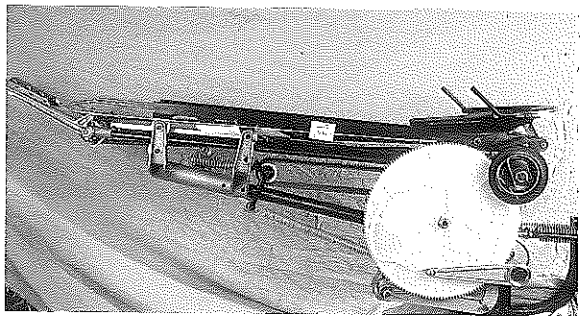
5. Pin Elevator Wheel

The pin elevator wheel carries the pins from the pit area and delivers them to the distributor.



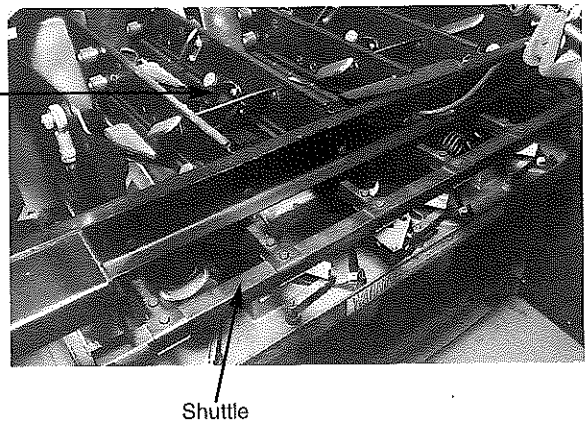
6. Distributor

The distributor delivers the pins from the pin elevator to the bin assembly. The distributor runs continuously and is driven by the back-end motor.



7. Bin and Shuttle Assembly

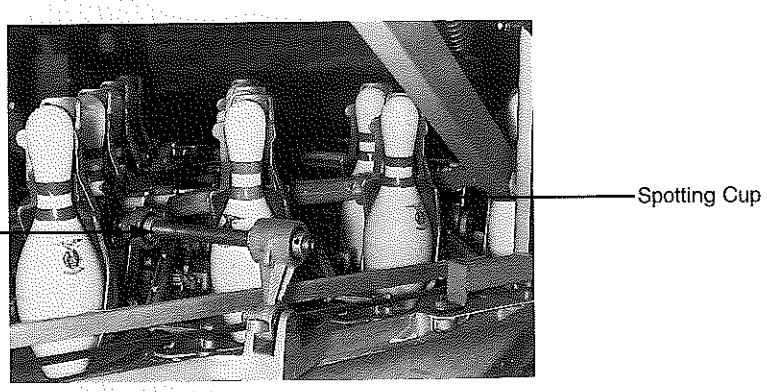
The bin stores pins received from the distributor until ready for spotting. The shuttle drops pins onto the table. Two sets of pins can be stored in the bin assembly until required. (20)



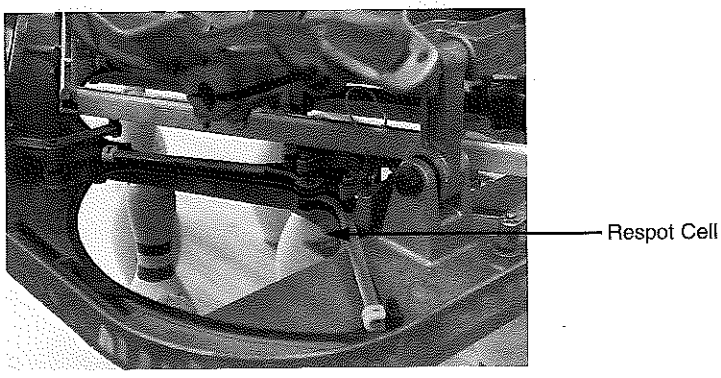
8. Table

The table performs its spotting and respotting functions by employing two component assemblies:

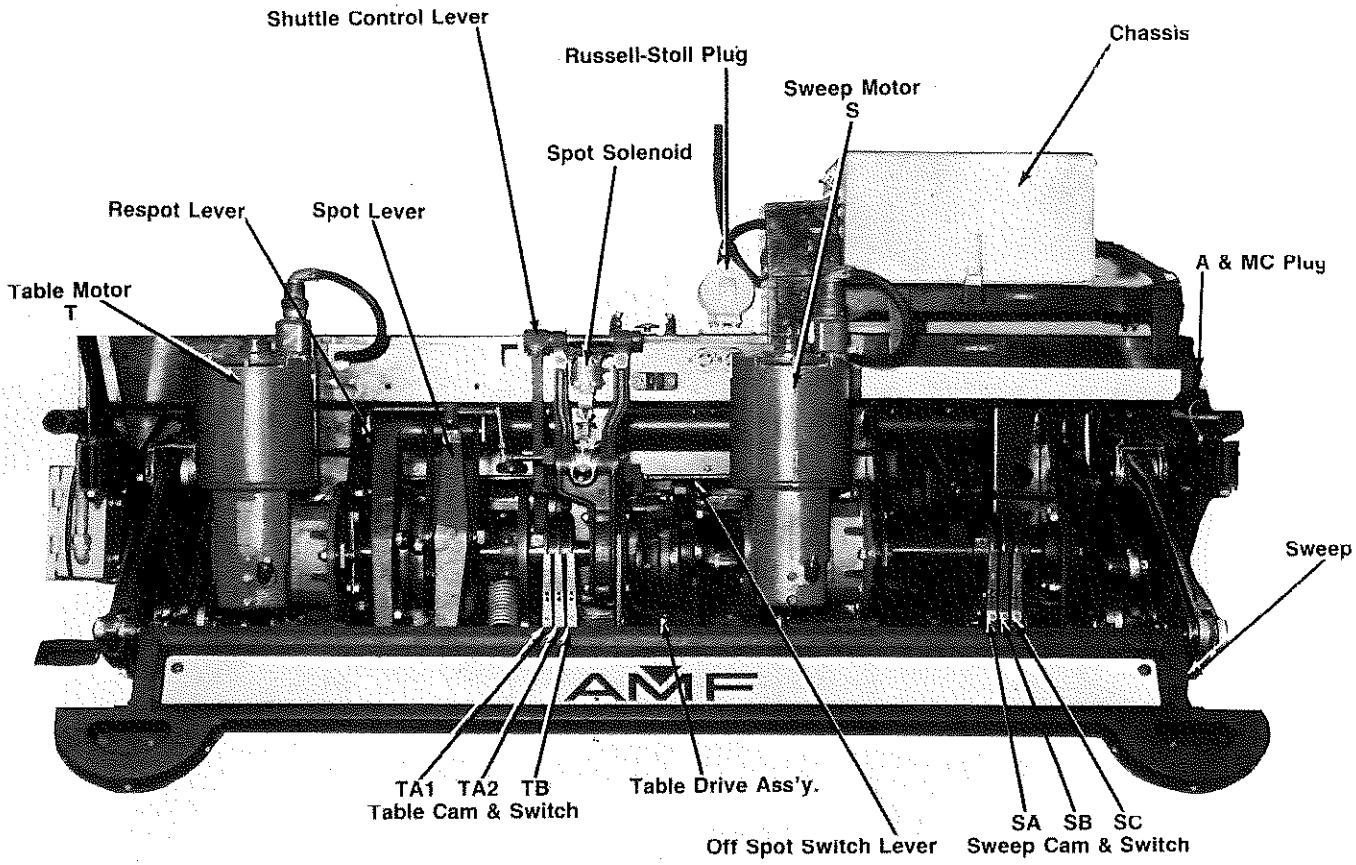
A. The **yoke assembly** supports the ten spotting cups.



B. The **table assembly** houses the ten respot cell assemblies.

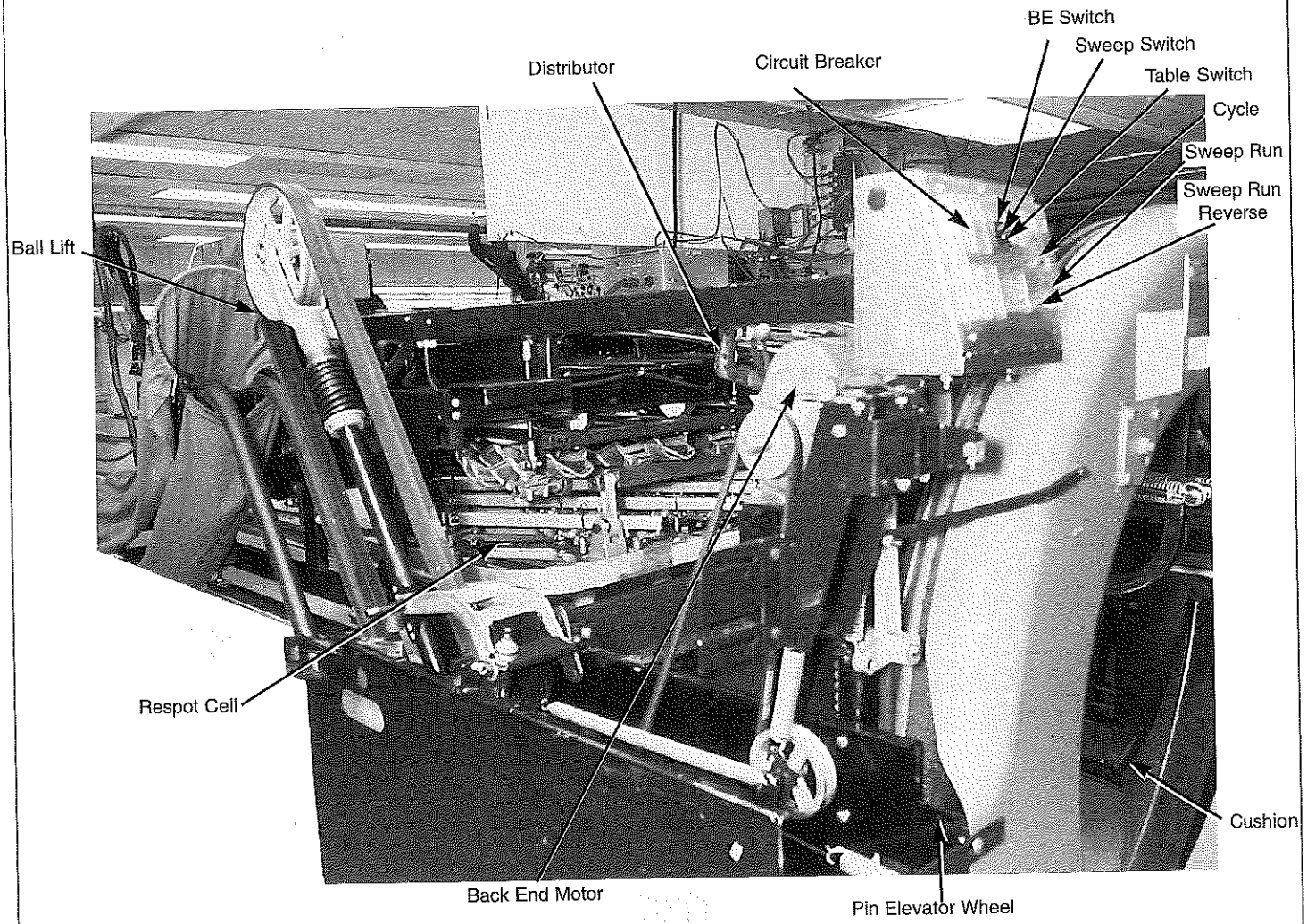


AMF 82-70C PINSPOTTER



AMF

82-70C PINSPOTTER



AMF BOWLING INC.
PINSPOTTER TRAINING

SWITCHES

MGR. CONTROL		TURNS MACHINE ON (BOWL OR INSTRUCTOMAT).
SS	START SWITCH	CYCLES MACHINE WHEN BALL HITS CUSHION. (NOTE 1)
OS	OFF SPOT	SIGNALS CHASSIS WHEN TABLE CONTACTS OFF SPOT PIN.
GS	GRIPPER SWITCH	SIGNALS CHASSIS WHEN PIN OR PINS ARE PRESENT ON PIN DECK AS TABLE PICKS UP STANDING PINS.
GP	GRIPPER PROTECTION SWITCH	PROTECTS TABLE FINGERS FROM DAMAGE. (WON'T LET TABLE FEEL FOR PINS WHEN OFF).
CB	CIRCUIT BREAKER	PROTECTS MACHINE FROM OVERLOAD OR SHORT CIRCUIT.
T	TABLE SWITCH	MANUAL SWITCH CONTROLLING TABLE RELAY.
S	SWEEP SWITCH	MANUAL SWITCH CONTROLLING SWEEP RELAY.
BS	BIN SWITCH	SIGNALS CHASSIS WHEN THE NUMBER NINE PIN IS PRESENT IN BIN.
SWS	SWEEP RUN SWITCH	RUNS SWEEP FROM REAR OF MACHINE. MANUAL.
SWSR	SWEEP REVERSE	RUNS SWEEP IN REVERSE. MANUAL. (USED WITH SWS)
PBZ	ZERO SWITCH	CONTROLS MACHINE FIRST BALL OR SECOND BALL STATUS. (USED TO RESTART MP CHASSIS "MANUAL INTERVENTION")
PBC	CYCLE SWITCH	CYCLES MACHINE FROM REAR.
10TH FRAME SWITCH		CYCLES MACHINE FROM APPROACH. BOWLER CONTROLLED.

MOTORS

BE	DRIVES PIN ELEVATOR, BALL ELEVATOR, PITVEYOR (CARPET), DISTRIBUTOR, PADDLE ASSY.
T	DRIVES TABLE.
S	DRIVES SWEEP.

SOLENOIDS

SPOT SOLENOID	CONTROLS TABLE WHEN SPOTTING PINS. (LATCHES SPOT LEVER, REMOVES SHUTTLE STOP, UNLOCKS TABLE DRIVE)

NOTE 1: In many Bowling Centers the start switch has been replaced with a photoelectric switch. This unit is placed in front of the pinspotter at lane height to detect the ball passing and start the machine in cycle.

AMF BOWLING INC.
PINSPOTTER TRAINING

82-70 WITH 6700 CHASSIS (5 BOARD)

RELAYS

M	MASTER	CONTROLS POWER TO M2, HALOLIGHT AND PITLIGHT
M2	TIME DELAY	CONTROLS POWER TO T1 AND KEEPS BACK END MOTOR AND BALL RETURN RUNNING FOR 30 SECONDS WHEN MACHINE IS TURNED OFF.
SP	SPOT	CONTROLS SPOTTING ACTION OF MACHINE BY SWITCHING SPOT SOLENOID. (AND RESPOT SOLENOID)
BE	BACKEND	CONTROLS BACKEND MOTOR
S	SWEEP	CONTROLS SWEEP MOTOR
T	TABLE	CONTROLS TABLE MOTOR
KLIXON		DEVICE THAT PROTECTS CIRCUITS FROM OVERLOADS
H		THERMAL UNIT FOR TURNING OFF M2
KX		PIN PRESENCE RELAY FOR SPAREMAKER

TRANSFORMERS

T1	SUPPLIES VARIOUS VOLTAGES TO CHASSIS FOR OPERATIONAL PURPOSES
T2	SUPPLIES 24 VOLTS AC TO THE MANAGERS CONTROL CIRCUIT

CAMS

TA1	TABLE	RUNS TABLE UP AND STOPS TABLE AT ZERO (355°) STARTS SWEEP UP AT END OF CYCLE
TA2	TABLE	STARTS SWEEP RUN THROUGH (260°)
TB	TABLE	CONTROLS TABLE-SWEEP INTERLOCK
SA	SWEEP	STOPS SWEEP AT 2ND GUARD, RUNS SWEEP UP AND STOPS SWEEP AT ZERO (360°).
SB	SWEEP	STOPS SWEEP AT THE FIRST GUARD. (66°) STARTS TABLE SPOTTING (186°)
SC	SWEEP	CONTROLS TABLE-SWEEP INTERLOCK.

AMF BOWLING INC.
PINSPOTTER TRAINING

82-70 WITH 9800 CHASSIS

RELAYS

M	MASTER	CONTROLS POWER TO THE T1 TRANSFORMER, HALO LIGHT, AND PIT LIGHT.
M2	SWEEP REVERSE	CAUSES SWEEP TO RUN IN REVERSE WITH AUTOMATIC SCORING.
BE	BACK END	CONTROLS BACK END DRIVE MOTOR.
S	SWEEP	CONTROLS SWEEP MOTOR.
T	TABLE	CONTROLS TABLE MOTOR.
SP	SPOT	CONTROLS SPOTTING ACTION OF MACHINE BY SWITCHING SPOT SOLENOID.
M1		TURNS ON BALL RETURN.
KLIXON		DEVICE THAT PROTECTS CIRCUITS FROM OVERLOADS.

TRANSFORMERS

T1	SUPPLIES VARIOUS VOLTAGES TO THE CHASSIS FOR OPERATIONAL PURPOSES.
T2	SUPPLIES 24 VOLTS AC TO THE MANAGER's CONTROL CIRCUIT.
T3	SUPPLIES 24 VOLTS FOR CIRCUIT BOARD.
T4	SUPPLIES 24 VOLTS FOR BE RELAY AND M1 RELAY.

CAMS

TA1	TABLE	RUNS TABLE UP AND STOPS TABLE AT ZERO. (355°)
TA2	TABLE	STARTS SWEEP RUN THROUGH, AND STARTS SWEEP UP AT END OF CYCLE. (260°)
TB	TABLE	CONTROLS TABLE-SWEEP INTERLOCK.
SA	SWEEP	STOPS SWEEP AT 2ND GUARD, RUNS SWEEP UP AND STOPS SWEEP AT ZERO. (360°)
SB	SWEEP	STOPS SWEEP AT FIRST GUARD (66°) STARTS TABLE SPOTTING. (186°)
SC	SWEEP	CONTROLS TABLE-SWEEP INTERLOCK.

Manager's Control*

Each machine is under control of the Lane Manager by a conveniently located set of switches at the Manager's desk. Each machine control switch is a three position switch: (I) Instruct-O-Mat, (B) Bowl, and Center the "OFF" position. Placing this switch in the "B" Bowl position, the machine will operate ready for bowling, providing the Master Line Switch, Machine Safety Switch and all other circuit breakers and control switches described later are in the "ON" position. Placing the Manager's Control Switch in the (I) instruct-O-Mat position applies power to the ball return and pin loading assemblies only; the Sweep and Table become inoperative. Practice balls can now be rolled and the ball will be returned in the normal fashion. The machine will not go through its cycles until the switch is returned to the "B" Bowl position. When this switch is turned "OFF", power is still supplied to the pinspotter chassis unless the Master Line Switch is turned "OFF" or the power plug is disconnected.

Pin Elevator, Sweep. and Table Motor Switches are provided to permit repair and maintenance work by allowing each unit to be turned off or on individually. They are to be kept in the "ON" position and should be turned off when a person enters the machine from the rear.

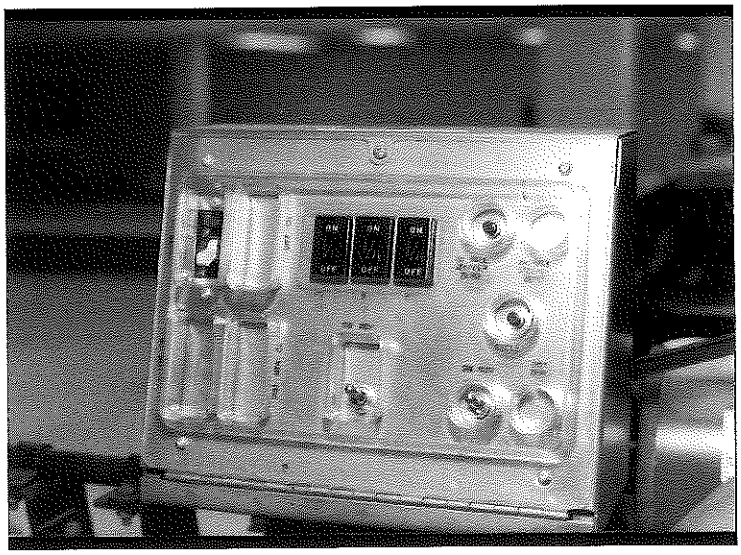
Sweep Run Switch is also located on the machine control panel and is used to run the sweep motor.

Sweep Reverse Switch is provided to allow the sweep to be run back to the guard or zero position. This switch must be held down and the Sweep Run Switch operated in order for the described action to take place.

The First Ball Stepper Zero Button is used to return the control circuit to its ready for first or second ball condition. This switch will also restart an MP Chassis.

A Cycle Button is also provided on the Machine Control Panel. It is used to start the machine on either a first or second ball cycle depending upon the condition that the control circuit is in.

*In a bowling center with automatic scoring, the manager's control switch functions may be performed at the manager's scoring console.



REAR CONTROL PANEL

TENTH FRAME BUTTON

A push button, located convenient to the bowler, usually on the ball return is provided to cycle the machine when required. In the event pins are left standing after the bowler has completed his game, the tenth frame button must be operated to signal the machine to set up pins for the next bowler.

Example #1-If a bowler "spares" in the tenth frame, but fails to knock down all pins with the "extra ball," the tenth frame button must be operated to set the machine for first ball for the next bowler.

Example #2-If a bowler "strikes" in the tenth frame, he is entitled to two additional balls. If his first "extra" ball is a strike but the second is not, the pins remaining on the lane must be removed before the machine is ready to receive the first ball of the next bowler. This is a accomplished by use of the tenth frame button.

Example#3-(Without Accuscore) Less than a full set of pins spotted for first ball in a frame. The "tenth frame" button is pressed to cycle the machine, which will go thru a first ball cycle respotting the pins and lighting the 2nd ball light. Now the "tenth frame" button must be pressed again to cycle the machine thru a "2nd ball cycle" spotting a new set of pins and lighting the " 1 st ball " light.

Bowler may now proceed to bowl.

In open play, the machine can be recycled by throwing the ball instead of using the tenth frame button.

CAUTION

Do not operate the tenth frame button at any time other than as described above. Damage to the machine could result should the bowler be in the process of delivering the ball.

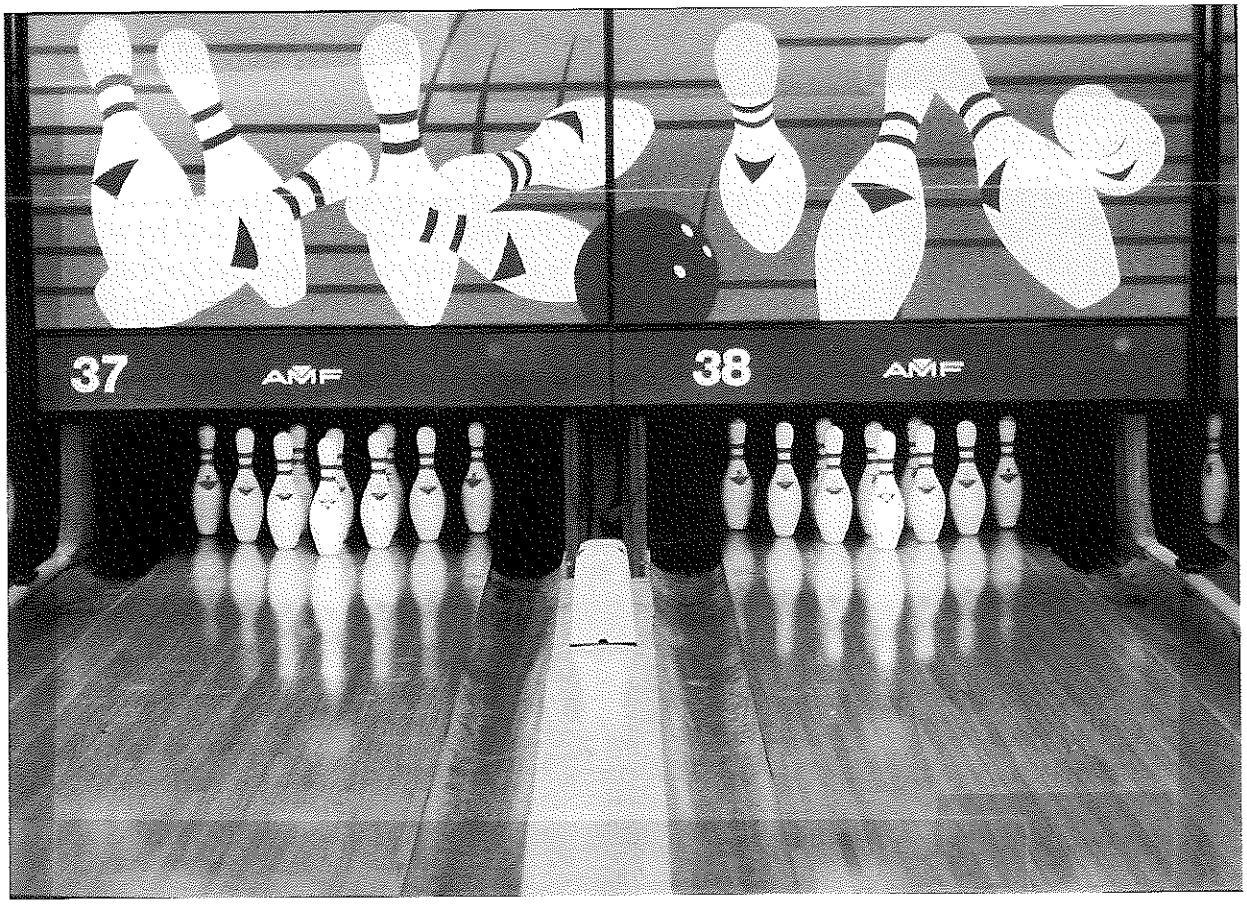
Enable respot only button-(Accuscore Installation Only) This button, located on Accuscore unit, is pressed to obtain a new set of pins whenever the first ball set is incomplete or a pin falls over.

The respot pins only button must be used to prevent the Accuscore from reading a false pinfall for first ball and advancing machine to "2nd ball" cycle.

AMF

MACHINE IDENTIFICATION

DESIGNER MASKS



In all AMF publications, reference is made to machines being either right hand or left hand. This information is especially important when ordering spare parts or when describing an intricate part of the machine. How do we determine whether a machine is right or left? One way is from the bowlers point of view.

Pictured above are lanes 37 and 38. These two machines are installed as a matched pair to accurately align the ball exit with the return rails. Since machine 37 delivers the ball to the right into the ball lift, it is called the right hand machine. Machines 38 returns the ball to its left and is called a left hand machine. Also, 37 is an odd number. All odd number lanes are right hand machines. Even number lanes are left hand machines.

Some machine parts will only fit the right or left hand side of a machine. The most accurate way to tell the right side of a machine from the left is also from the bowler's point of view. As the bowler stands facing the machine, the machine's right side is on the bowler's right side, the machine's left side will be on the bowler's left. This is true for both right and left hand machines.

MECHANICAL CYCLES OF THE MACHINE MODEL 82-70

FIRST BALL CYCLE

The machine, as we will consider it, is now ready for the first ball with first ball light on the sweep and table in the up position. Ten pins are on the spot pattern on the pin deck. The start switch, (SS), will be actuated completing the cycle start circuit. The sweep will run to its down or guard position, (SB),. Here, it will rest until called upon to sweep pins. A time delay is set in motion and, at its conclusion, the table will start its first descent to detect pins. Ten respot cell switches, (GS), indicate to the electrical system whether or not there are pins standing. If pins remain, they are mechanically gripped and raised to a height sufficient for the sweep to pass under them and clear the lane of dead wood, (TA2). The pindicator registers the pins left standing. After sweeping the deck, the sweep will again come to rest at the forward position and become a machine guard, (SA). The table continues upward through its "zero" position and starts another revolution, this time to respot the pins. As the table "zero" is approached for the second time, the sweep will raise and stop its up position, (SA), and the table will stop at the end of its revolution, (TA1). The first ball light is out and the second ball light is on.

SECOND BALL CYCLE

For the start of the second ball, the sweep is again at rest in its up position and the table is at zero. The (SS) start switch closes and starts the machine cycle. The sweep drops to first guard (SB). A time delay is set in motion which delays the sweep before its run through. The sweep then performs its sweeping operation and returns to its forward guard position, (SA). At this time, the table receives its spotting signal, (BS), and the spotting cups will swing downward to set up a complete set of pins as the table begins its revolution. As the table approaches the end of its revolution, the sweep will raise to its up position, (SA), and the table will stop at zero, (TA1). The second ball light is off and first ball light is on.

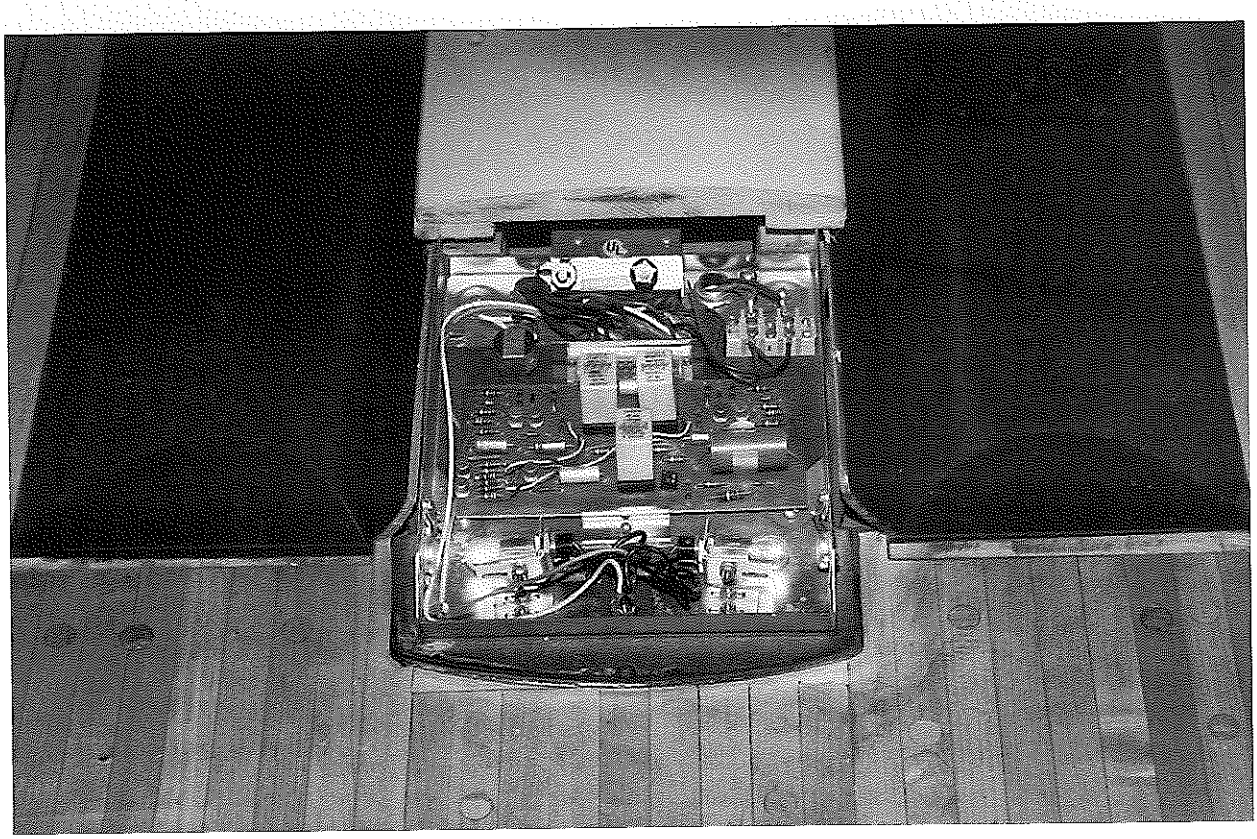
STRIKE CYCLE

In the strike cycle, the machine components are all in the same condition as described previously when the machine was ready for first ball, except there are no pins on deck. The start switch, (SS), will be closed. The sweep will drop to the guard position, (SB), and the time delay is started as in First Ball Cycle. At the completion of the delay, the table will descend to feel for pins. When the table finds that there are no pins to be picked up, the ten respot cell switches, (GS), will not operate and the machine will override the normal cycle functions of first ball and proceed to second ball spotting functions. The first ball light goes off and the strike light comes on. As the table proceeds toward the end of the first revolution, the sweep will clear all of the wood from the lane. If the table has received a full set of pins, (BS), it will then begin the second revolution or spotting cycle. By operating the spot solenoid, the table cups will be allowed to swing down to deposit the set of pins on the lane. During the spotting revolution, the electrical circuit is reset to first ball, the sweep will come to its up position, (SA), and the table will come to rest at "zero", (TA1). The machine will be idling with the sweep up, the table up and the strike light will be off and the first ball light will be on.

THE FOUL DETECTOR

Every AMF Pinspotter Control Chassis has the capability of preforming a foul cycle. All that is required is a signal from an external source. This signal comes from a foul detector when the bowler crosses the foul line. Most foul detectors will sound a buzzer as well as lighting the foul light on the masking unit. Foul detectors are usually installed with their own on-off switch so they can be turned off in open play.

82-120 FOUL DETECTOR



FIRST BALL FOUL CYCLE

When the ball is rolled and the bowler commits a foul, the foul detector unit operates and prepares the machine for a foul cycle. The ball hitting the cushion will start the machine. The sweep drops to the guard position and completes its sweeping operation stopping at the forward guard. The table, when full of pins, will begin its spotting operation. The table cups will swing down and deposit a full set of pins on the spot pattern on the lane. When the table nears the end of its travel, it will signal the sweep to begin its rise. The electrical system will remain ready for second ball with the second ball light on. The table will stop at zero and the sweep at its up position. The pins that were swept off the lane are carried into the pin elevator wheel and distributed to the various bin locations on the machine. In addition to taking over control of the machine, the foul detector unit energizes a foul light on the pindicator and rings a bell or buzzer.

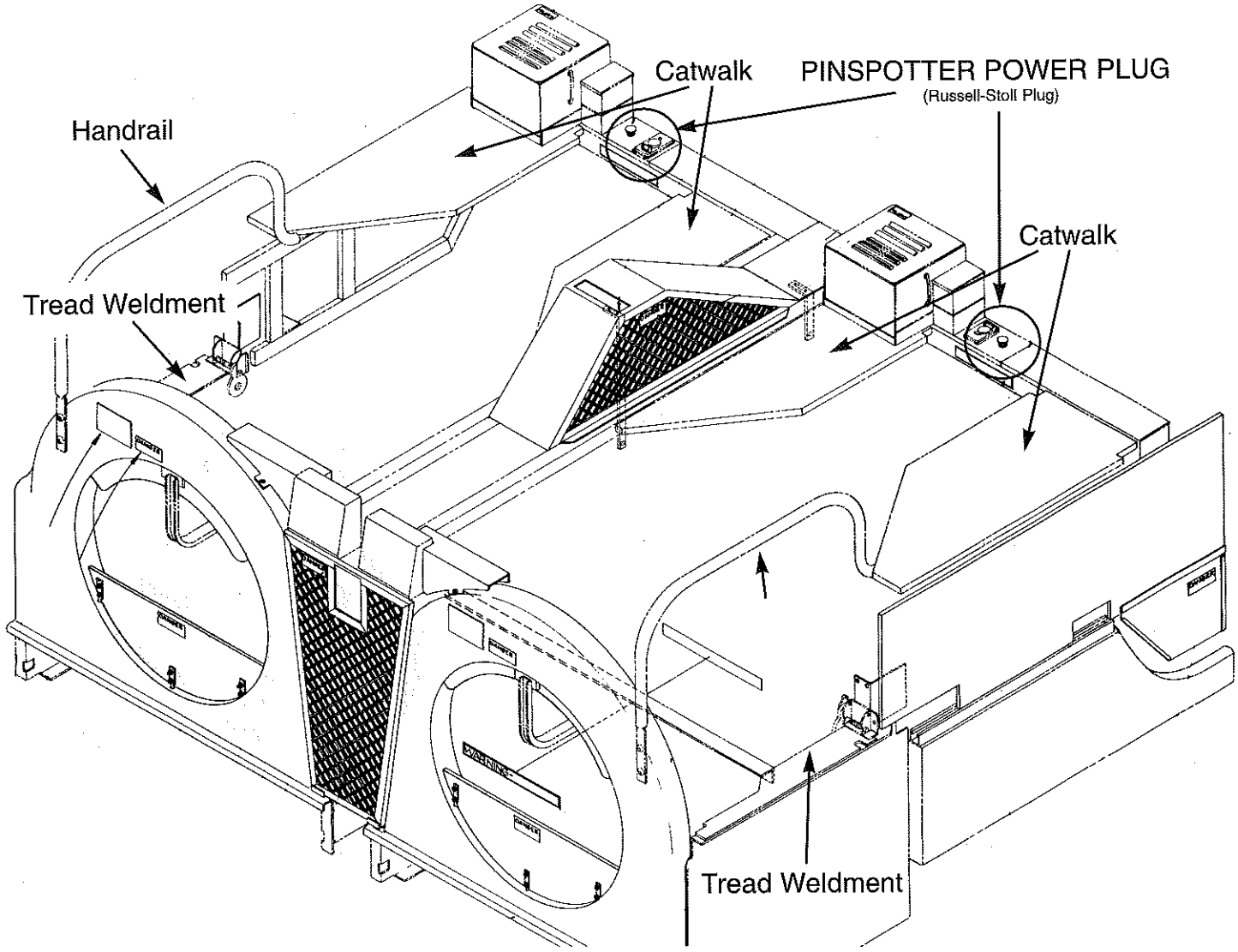
SECOND BALL FOUL CYCLE

Should the bowler commit a foul when delivering his second ball, the machine will perform a normal second ball operation. The foul detector unit will operate the foul light and bell or buzzer.

Pin Spotting Pattern

WHERE TO STAND

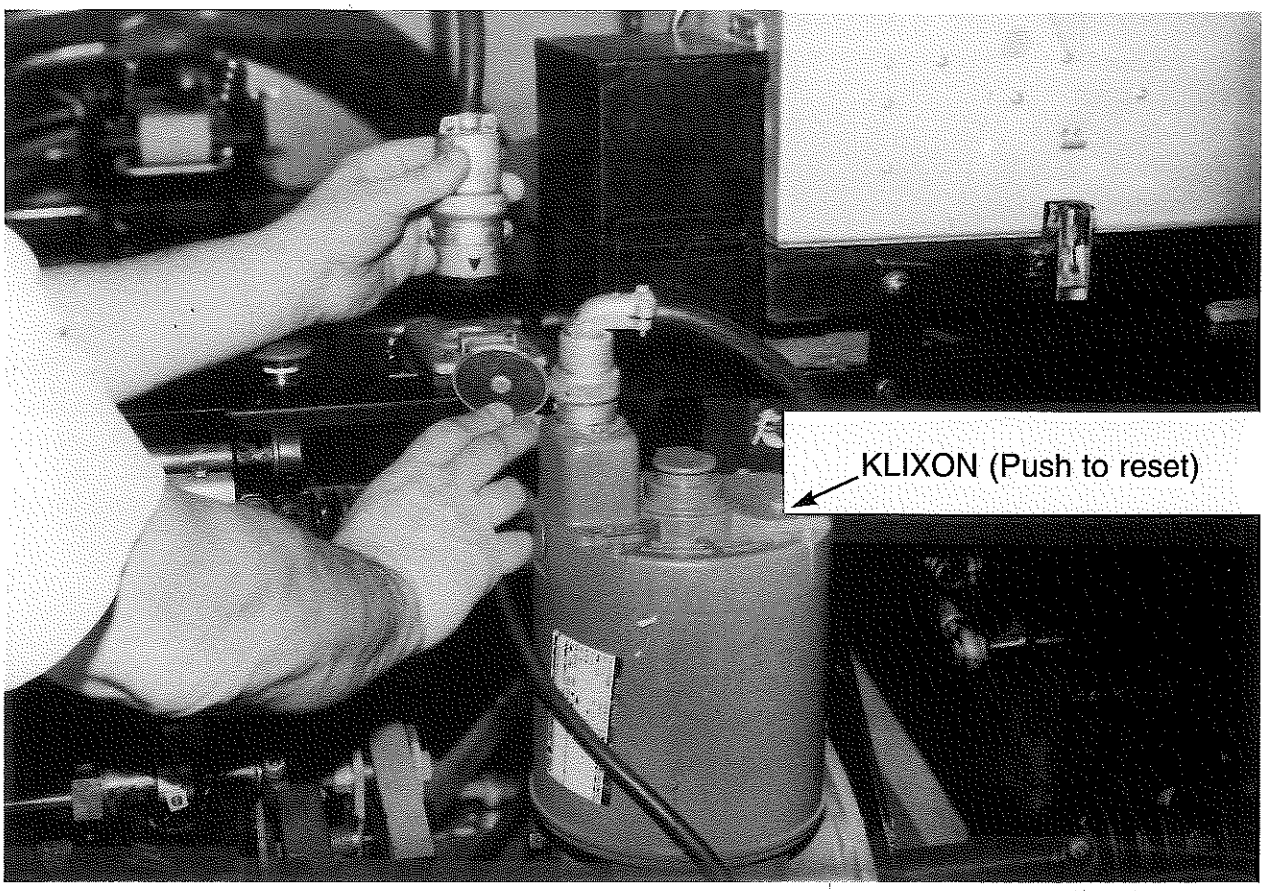
The wooden catwalks afford the mechanic a safe place to stand on top of the machine while observing pinspotter operation or clearing a problem. There is a hand rail and tread weldment to aid in getting onto the machine. Some mechanics add a step below the tread weldment to make machine access easier.



PINSPOTTER POWER PLUG

(Russell-Stoll Plug)

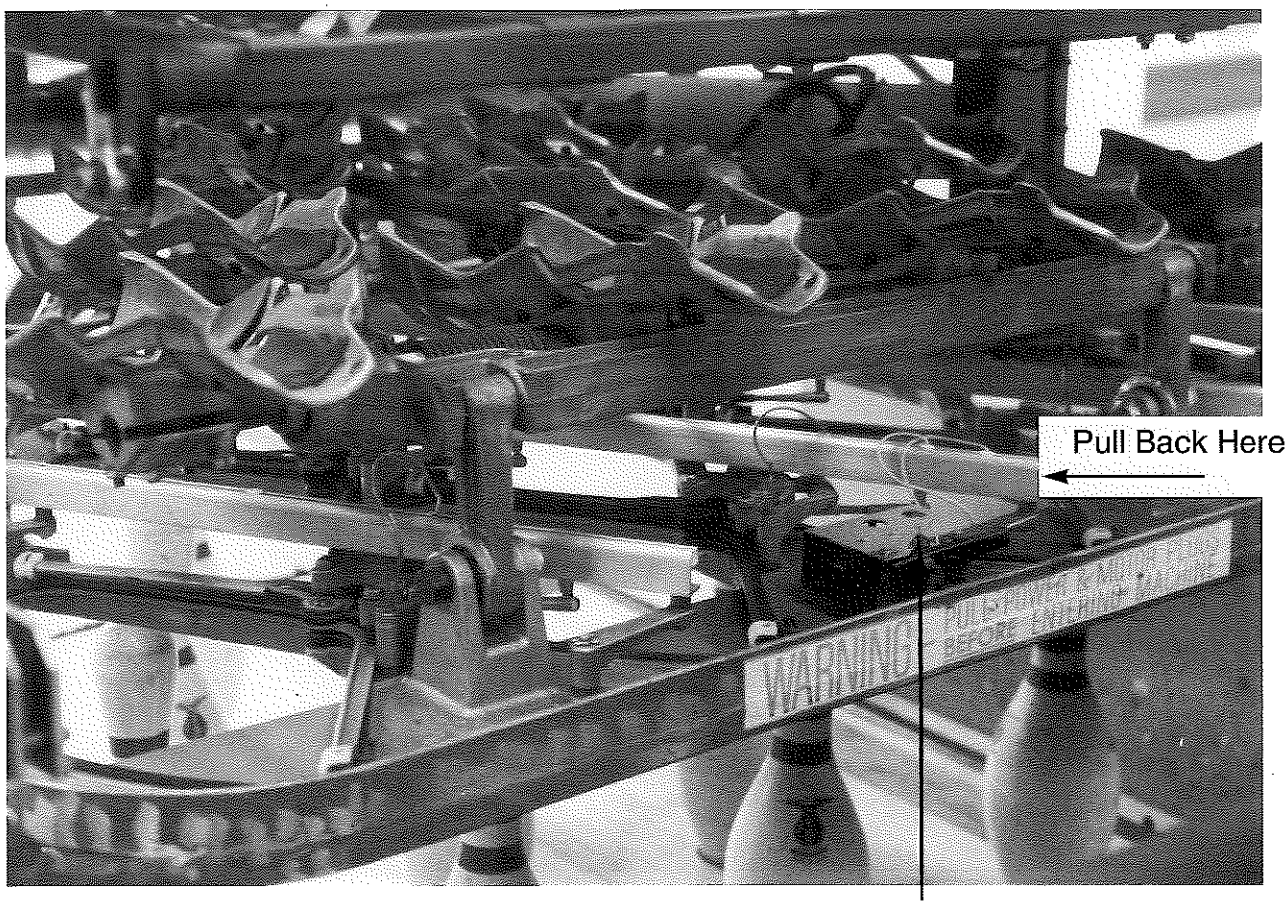
Power is connected to the pinspotter by a 3-conductor twist-lock polarized plug. The plug must be twisted counter-clockwise in order to be removed. Since the plug is polarized it can only be inserted into the receptacle in one way. None of the switches on the machine remove the power. Power is removed only by removing the power plug. Always remove the power plug when working on the machine or before entering any operating portion of the machine.



NOTE: The three motors on the pinspotter also use twist-lock polarized plugs.
The klixon is used as a protection device for the motor.

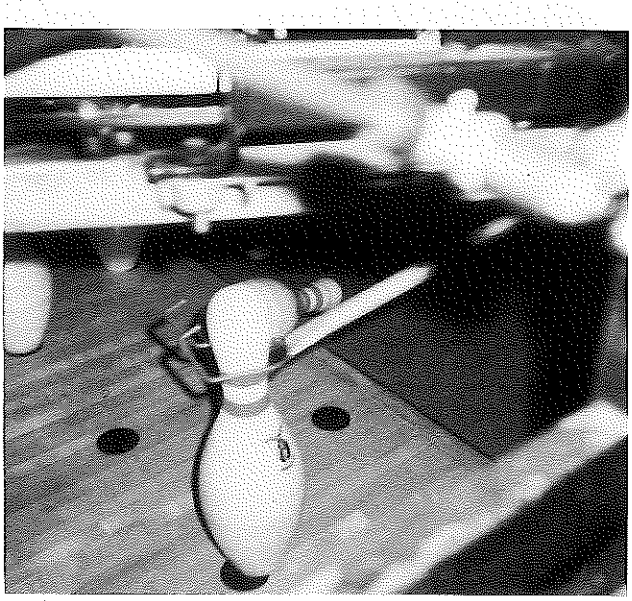
RESPOT CELL PROTECTION SWITCH
[GP SWITCH]

The respot cell protection switch is located at the back of the table between the #8 and #9 respot cells. If the respot cells are closed in a first ball cycle, the table will not feel for pins. The respot cells can be opened by pulling the drive linkage back toward the rear of the machine. After the cells are opened, there will be a 2-1/2 second delay before the table starts to move. The GP switch has no function in a second ball cycle.



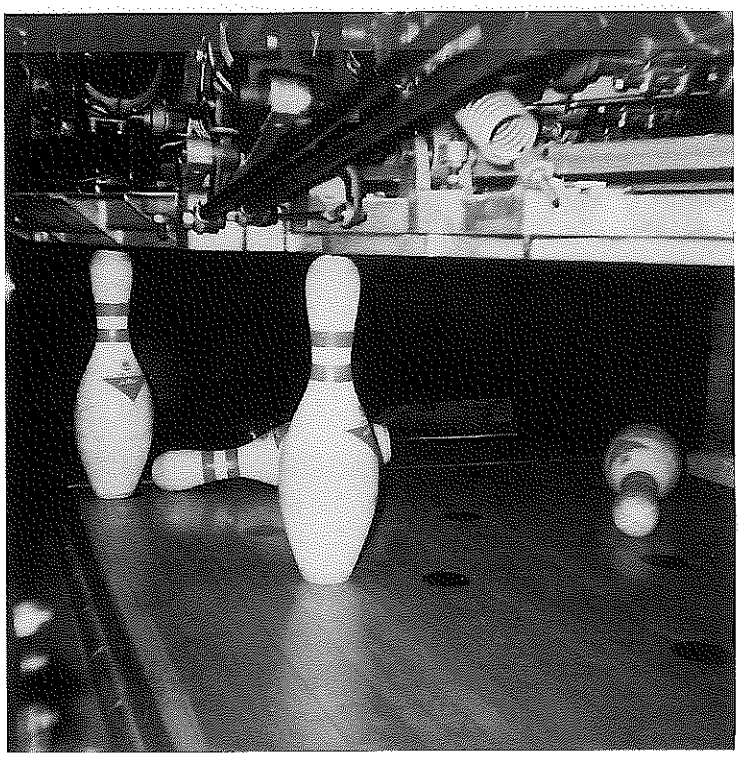
PIN HOOK

A pin hook is used to pull fallen pins (dead wood) from the deck into the pit. It can also be used to pick up pins that are in front of the sweep. A pin hook is also useful in setting up pins for the bowler. Extreme caution must always be used so the pin hook does not become wedged in any assembly or struck by a bowling ball.



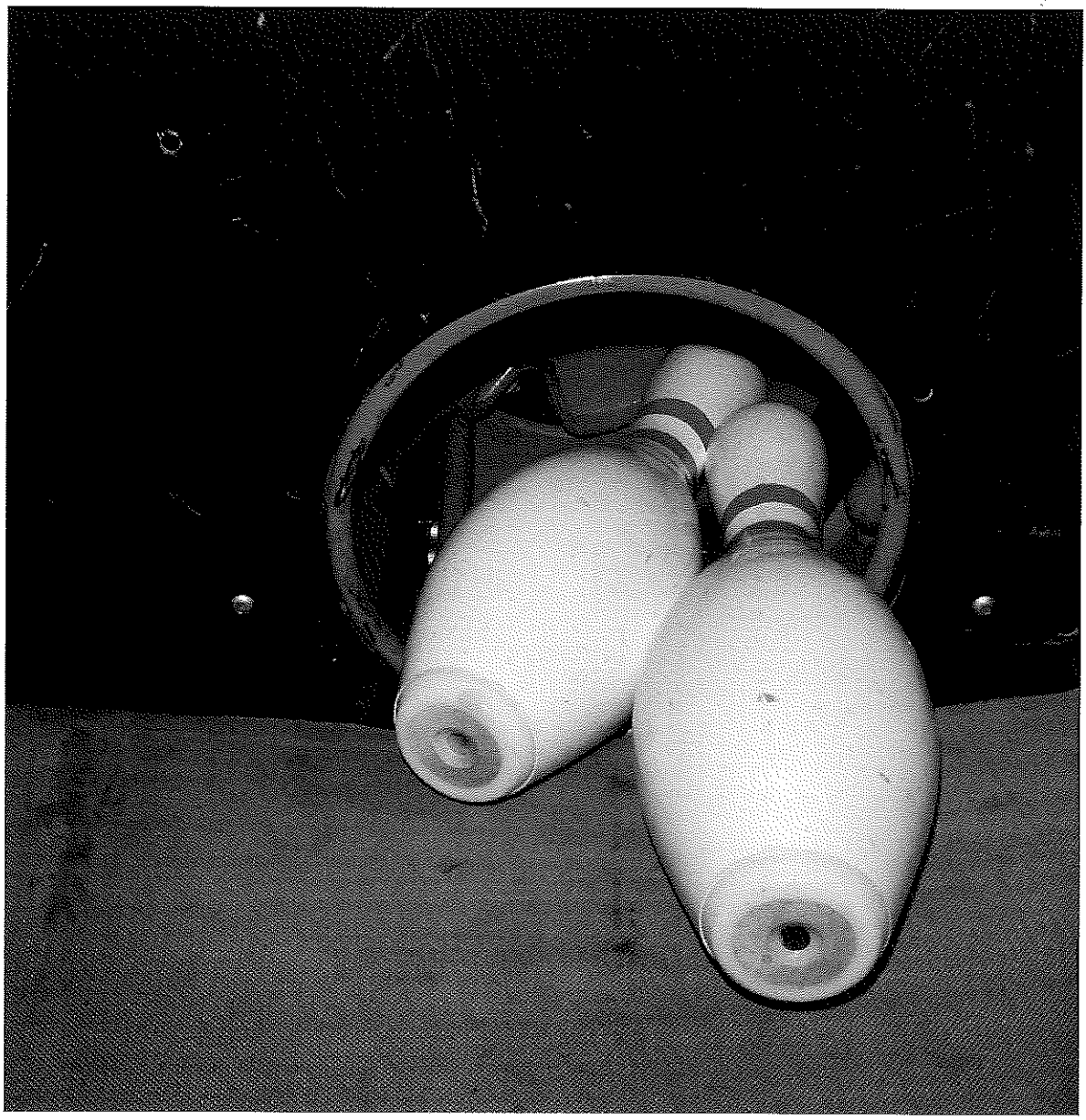
OFF SPOT PIN

If the downward movement of the table is stopped by an offspot pin in a first ball cycle, the offspot switch will be turned on. This switch being turned on, converts the chassis to second ball, stops the table after one revolution of the table shaft and holds the sweep at first guard. Before the Bowler can continue, the maintenance man must remove the deadwood from the deck with a pin hook. The respot cells should be pulled open since they are less likely to be damaged when opened. Then hold the sweep reverse switch on, and press sweep run to bring the sweep backwards to its zero position. Do not overrun the sweep zero position as the sweep will go to second guard. If this happens, use only sweep run to return the sweep to zero.



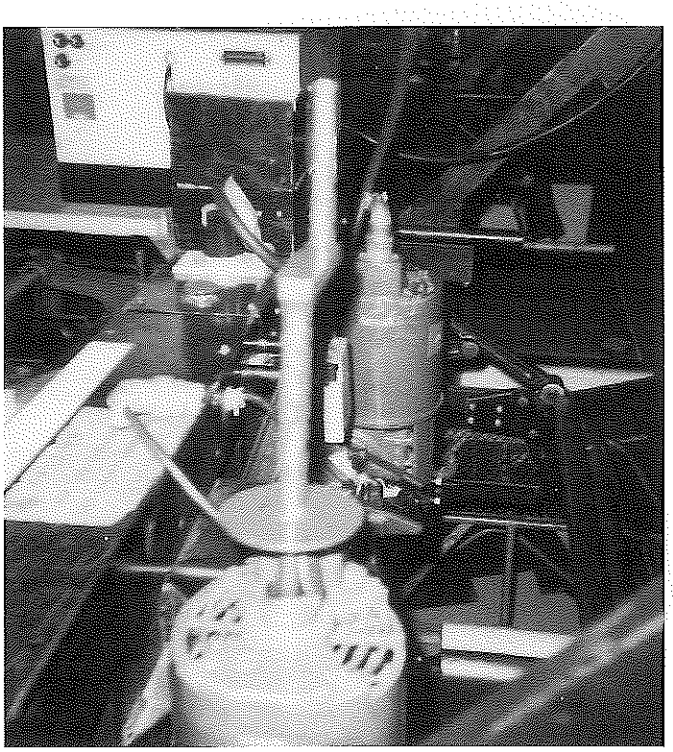
BALL EXIT

Pins in the ball exit will prevent the ball from being returned to the bowler. Pins can be pulled from the ball exit with a pin hook. Do not reach into the exit with your hands. The pin deflector curtain may be released and placed over the cushion tube weldment to make the ball exit more accessible. The sweep should be run down to the guard position to prevent the bowler from rolling another ball. The pin curtain must be latched into position and the sweep reversed to its zero position after the ball exit has been cleared.



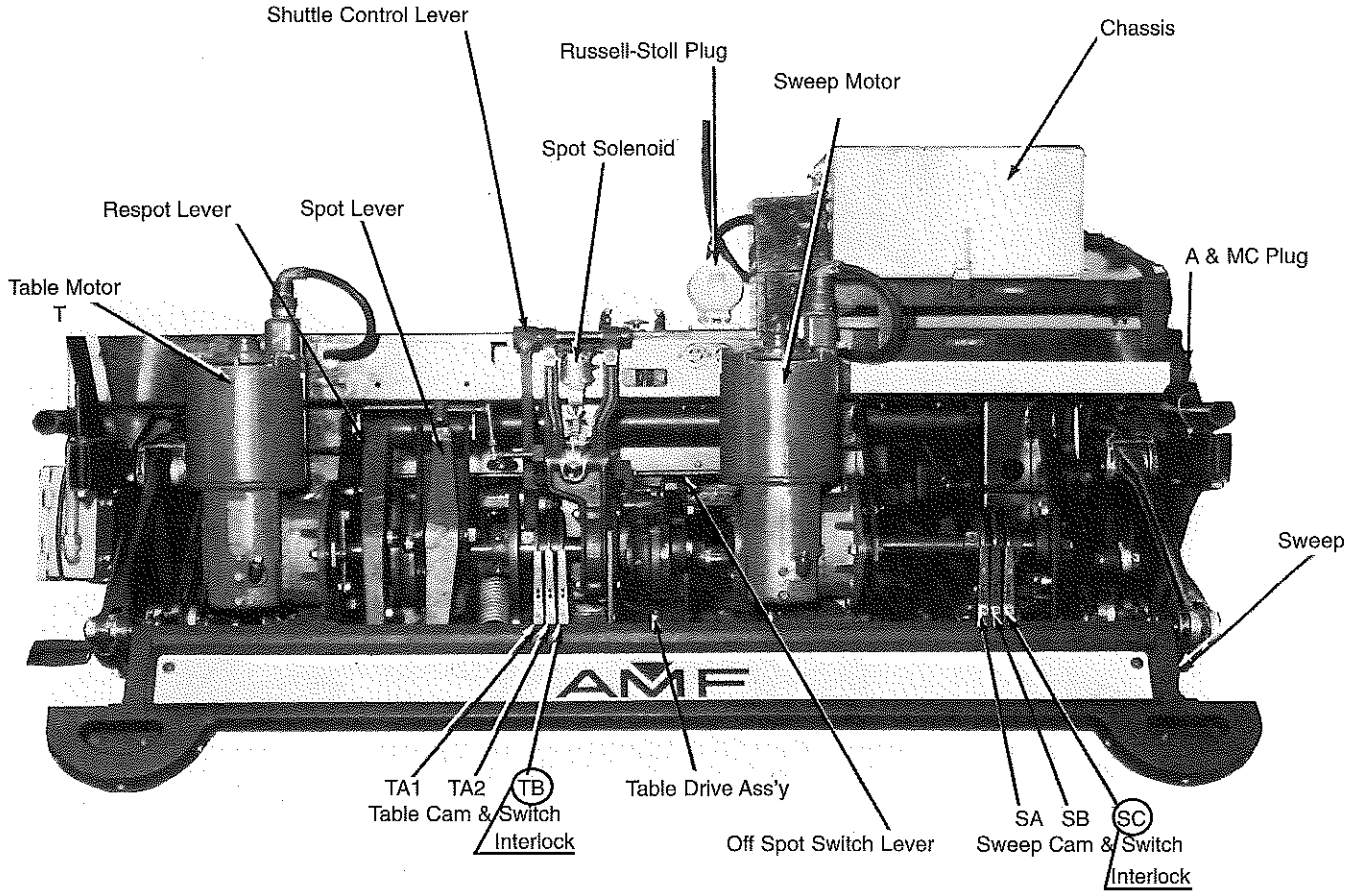
MOTOR CRANK

The combination motors (table and sweep) used on the pinspotter have the motor shaft extended through the end cover so the motor can be cranked by hand. Cranking the motor is sometimes necessary when doing service work or clearing an interlock condition. The motor power plug must be removed before the motor crank is inserted into the motor. Motors may be cranked in either a clockwise or counter-clockwise direction. The motor crank must be removed before the motor power plug is re-inserted into the motor.



INTERLOCK PROTECTION

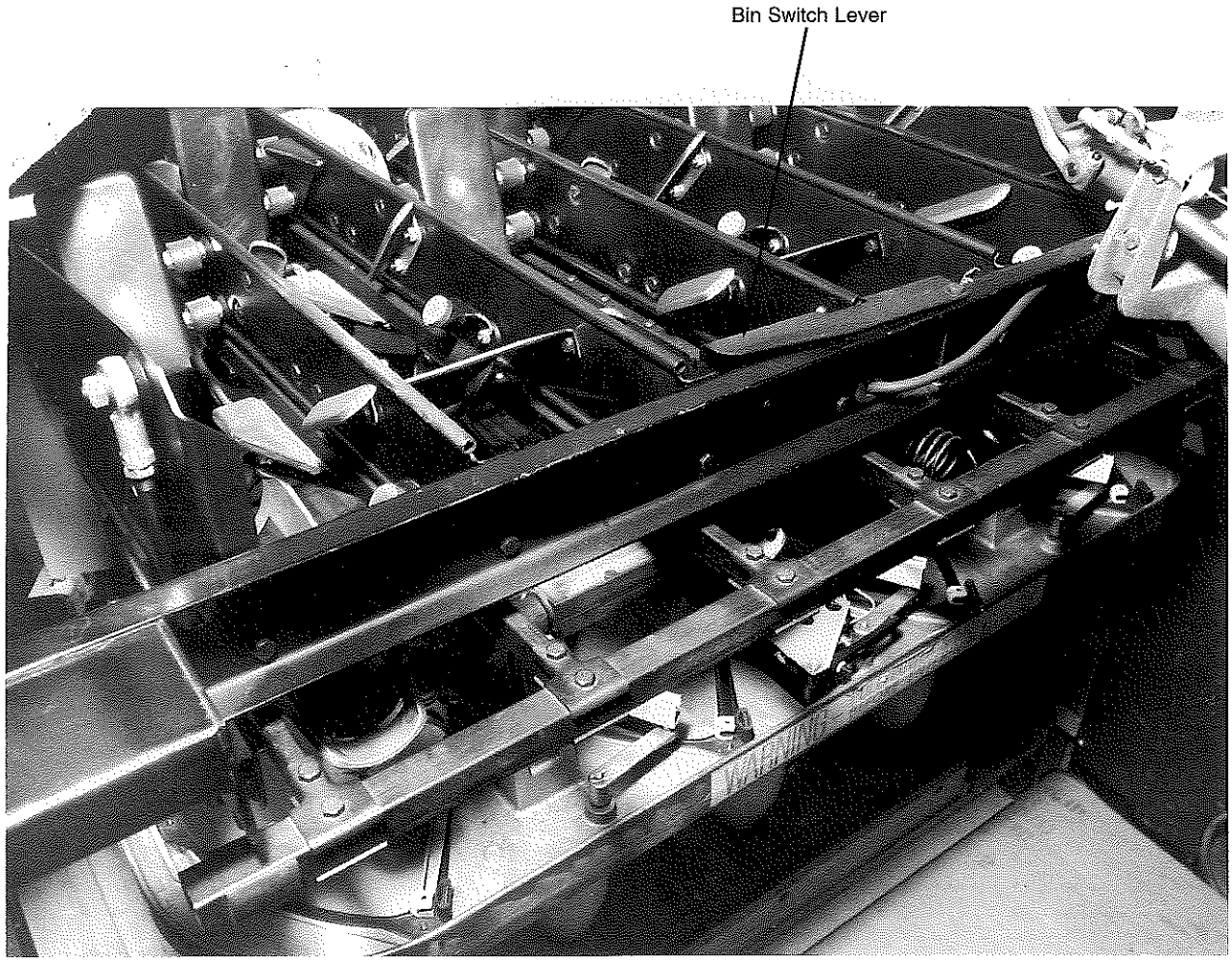
If, for any reason, the table and sweep are on a collision course, both motors will be turned off. This is accomplished by two switches, TB and SC, wired in parallel with one another and in series with the power source for the table and sweep motor relays. In an interlock condition, none of the normal table or sweep run switches will work. To clear an interlock, the motors should be unplugged and the table motor cranked to raise the table high enough for the sweep to run back to guard. The sweep motor plug should be inserted first allowing the sweep to move from under the table. Then the table motor plug can be inserted into the motor permitting the cycle to be completed.



BIN SWITCH
[BS]

The bin switch is located in the bin framework between the #8 and #9 bin locations. The bin switch actuating lever is in the #9 bin. When the #9 pin is placed in the bin, the bin switch is turned on permitting spotting of new pins to take place. The #9 pin is the tenth or last pin fed in the distributor pin feeding sequence.

When clearing pins that have piled up on top of the bin, it is important that a pin has been placed in each bin location before the #9 pin is placed into its position. If the #9 pin is placed in the bin before the other pins, there may be less than a full set of pins spotted on the deck.



DISTRIBUTOR

The distributor transfers pins from the elevator wheel to the bin. In clearing a pin pile up, it may be necessary to advance the distributor to the proper location. This can be accomplished by pressing down and then releasing the distributor index lever. The distributor moves one bin location each time the index lever is pressed down and released.

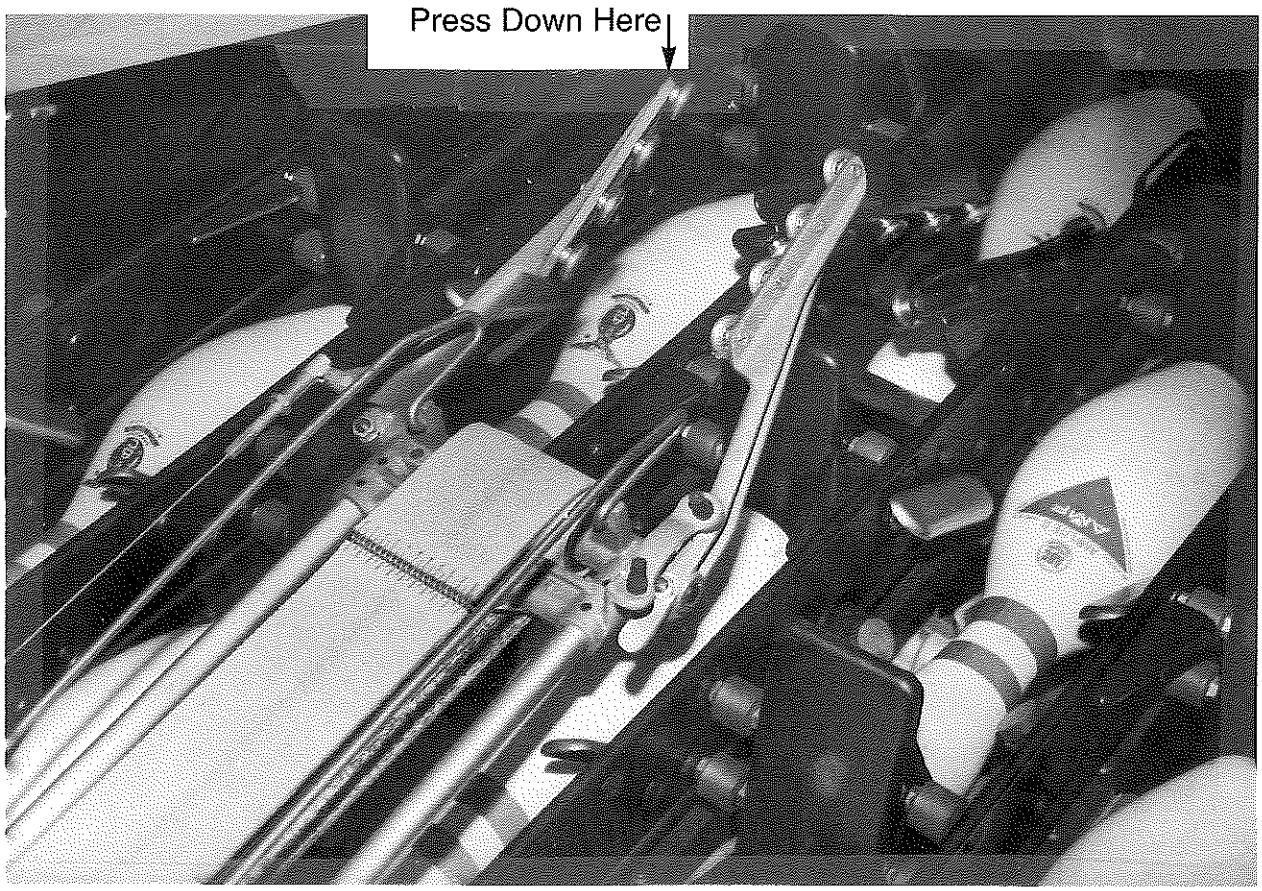


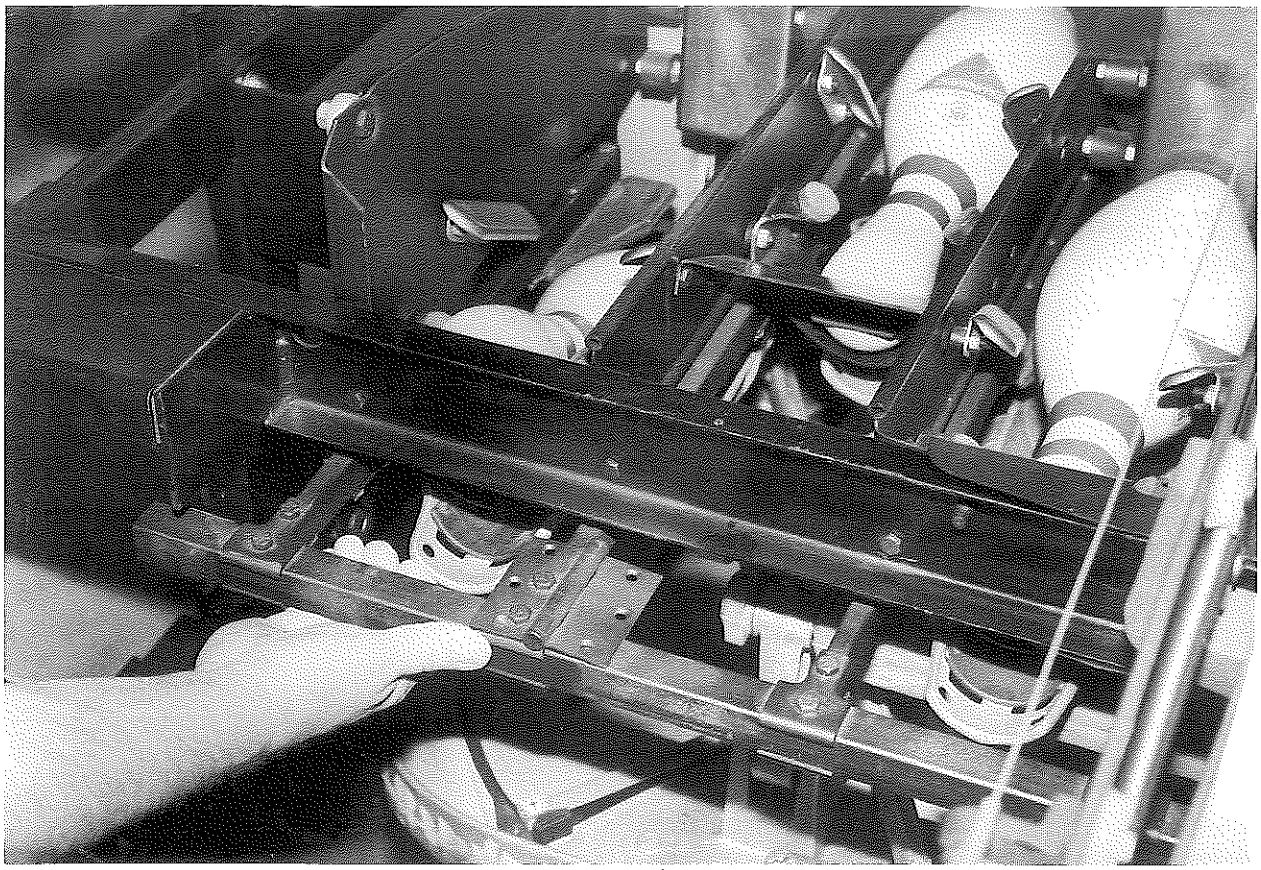
TABLE SPRINGS
(Yoke Shaft)

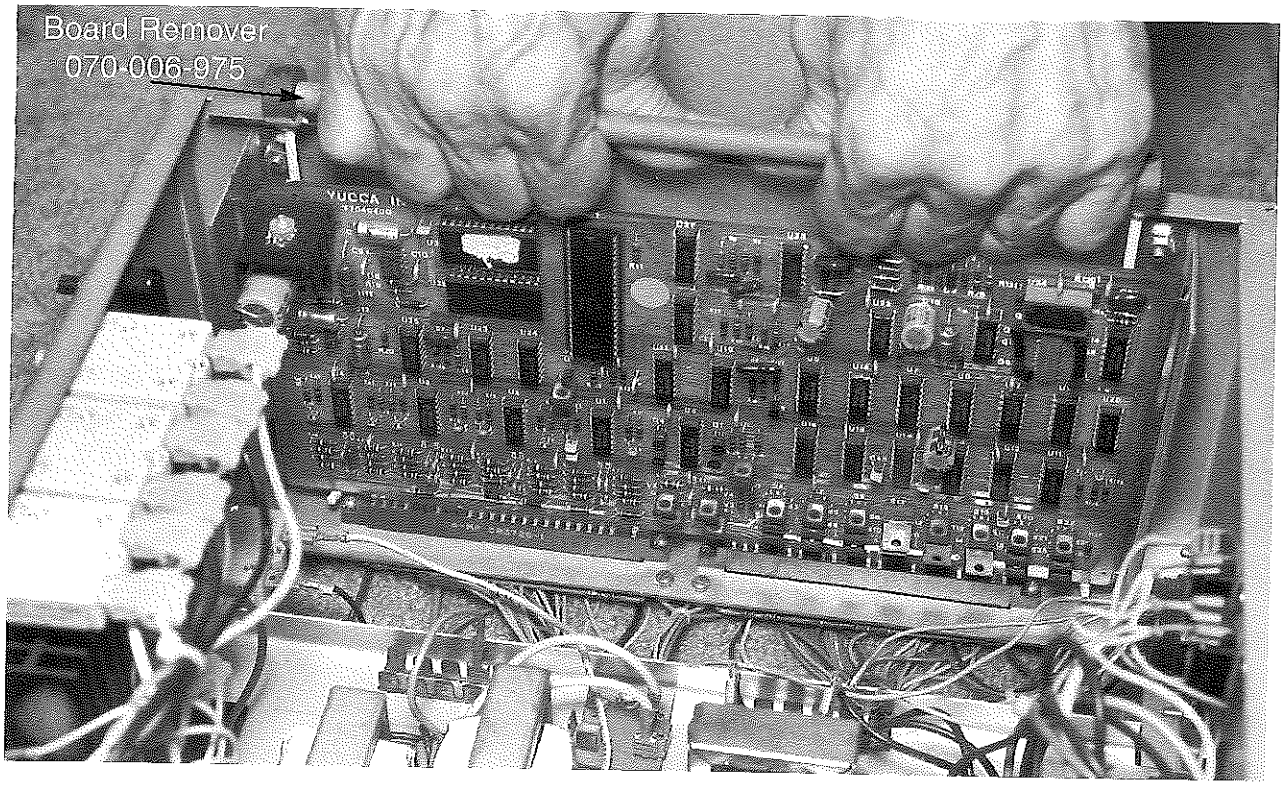
Springs are used on the yoke shafts to stabilize cup movement in a spotting cycle. Occasionally a pin may become jammed between the yoke and the table. This may hold the spotting cups in a vertical position when the table comes up. When this occurs the table should be cranked down to relieve some tension, and to gain clearance between the yoke and the bins. The cups can than be turned more vertical to free the jammed pin. When the pin has been freed, the cups can be allowed to turn back to a horizontal position. Care must be used here as there is considerable spring tension on the spotting cups. The table should be returned to its zero position.

ADD PINS OR MAKE SET-UPS

If a bowler requests one or more pins to be added to those left standing on the deck, a pin hook is generally used to accomplish this. **Caution** must be used as the bowler may become impatient and roll another ball.

Sometimes, a bowler will request a set-up or specific pins to be placed on the deck for second ball. One way to do this is to spot a full rack and remove the unwanted pins with a pin hook. Another way is to put the requested pins through the shuttle, then hold the shuttle in a spotting cycle so only the requested pins are spotted. The chassis should be stepped to second ball and the missing pins replaced in the bin. **Caution** must be used here so the shuttle does not move and injure your fingers. Your fingers should come from the bottom up to reduce the possibility of injury.





PRINTED CIRCUIT BOARD REMOVAL

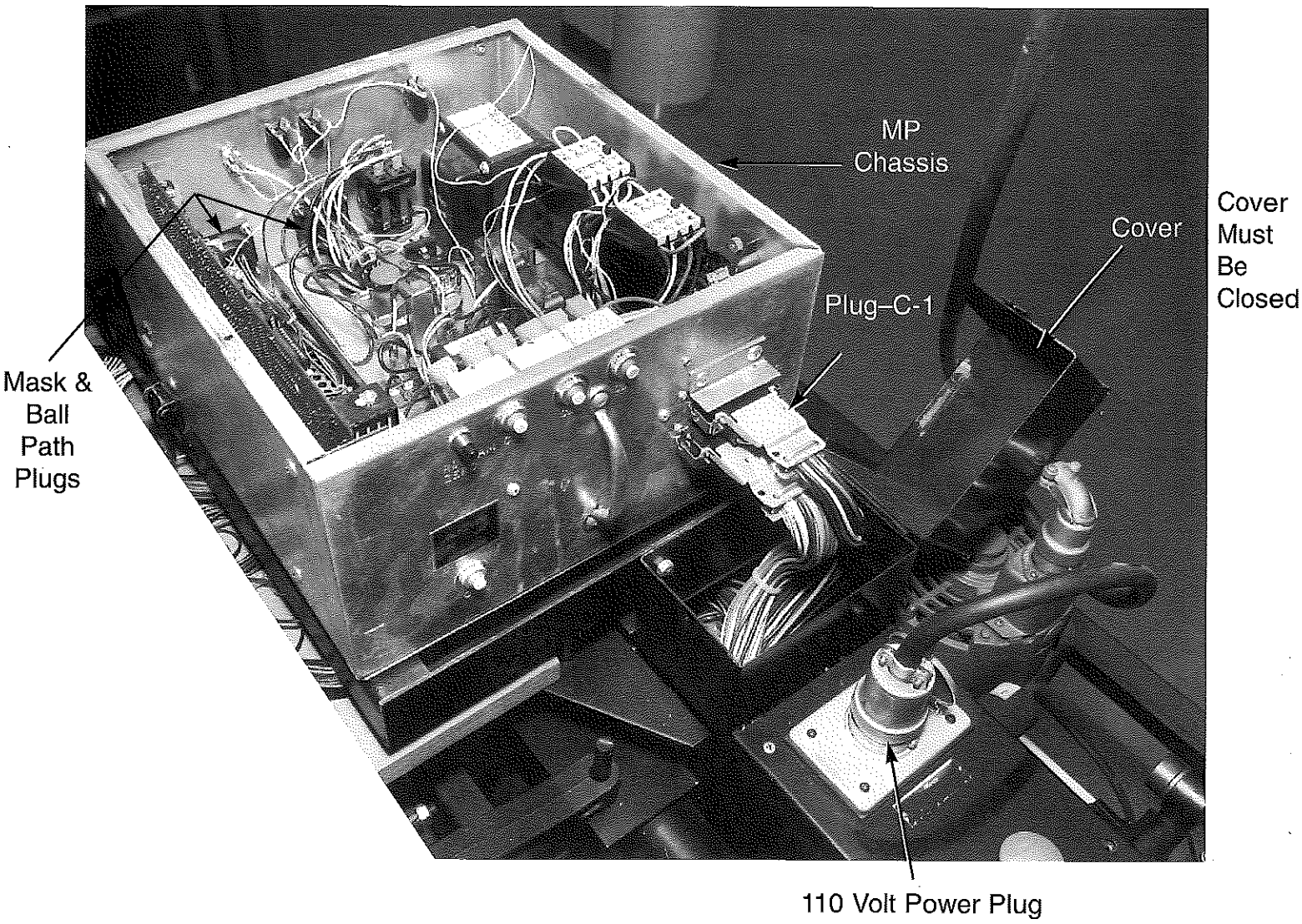
NOTE: Remove power and wait one minute before removing boards.

1. Insert board puller under board to be replaced as shown in the above picture. (Care should be exercised as puller may become caught in stray chassis wires.)
2. Apply an upward pressure using the thumbs as leverage, and ease the board out of the socket.
3. When inserting a new board, be sure the printed circuitry of the board mates with the contacts of the plug.

NOTE: Board removal tool not required with new M/P circuit boards.

CIRCUIT BOARD HANDLING PRECAUTIONS

1. **DO NOT** remove the circuit board while power is on.
2. **ALLOW** one minute capacitor discharge period after removing power before removing circuit board.
3. **USE** a board removal tool if circuit board does not have card ejectors.
4. **WEAR** a grounding strap when working with microprocessor boards.
5. **DO NOT** handle boards with dirty hands.
6. **DO NOT** flex the circuit board, this could damage the foil.
7. **DO NOT** write on the boards, this could cause a short.
8. **IF** you need to indicate a defective part or solder joint, use a piece of masking tape.
9. **EXAMINE** a suspected bad board for broken or loose components.
10. **USE** A pencil eraser to clean circuit board contacts where they mate with the terminal strip.
11. **RECHECK** a suspected bad board in another chassis before returning.
12. **KEEP** circuit boards in their protective container until they are to be installed in the chassis.
13. **STORE** spare boards in the box they are shipped in.



CHASSIS REPLACEMENT

1. Remove 110 volt power to the machine by pulling the power plug.
2. Release the camloc handles which hold the chassis to the frame of the machines.
3. Loosen the plug cover and disconnect the "C" and ball path plugs by firmly depressing the spring clips and pull outward very carefully. Round plugs are threaded.
4. Lift chassis out of position and replace with new one following the reverse order. Reconnect all cables.
5. Apply power to the pinspotter and check operation for first ball, second ball, strike, and foul cycles.

AMF BOWLING INC.
PINSPOTTER TRAINING

"DESK" DAILY CALL SHEET

Date_____ Shift_____

TIME	LANE	CALL	MINUTES

TROUBLE CALL RECORD

Shift _____ Date _____

	Pin in Exit	Ball in Exit	Ball Won't Enter Exit	Out of Range	Interlock	Add Pins	Pin Pile Up	Set Up	Other (Explain) (use back if more space is needed)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
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PINSPOTTER MAINTENANCE

The *AMF Automatic Pinspotter* had been designed and engineered to give efficient service in spotting pins and returning the ball to the bowler. To maintain this efficiency as well as economical operation, proper preventive maintenance is required.

Preventive maintenance encompasses many things. However, the most important are proper adjustment, cleaning, lubrication and replacement of worn parts. Proper adjustments as per directions in the service manual are easy to accomplish and maintain and will give you smooth, efficient operation. Cleaning and proper lubrication of the pinspotter will eliminate excessive wear on moving parts. It is also recommended that a part showing excessive wear be replaced. In many cases, replacements of a minor worn part can eliminate progressive wear in a major assembly, therefore saving the proprietor unnecessary down time and money.

After your goal is reached and to ensure continued efficient operation, it will be required that 30 to 60 minutes of preventive maintenance per machine per week be scheduled. This work is best done when the machines are down or bowling is at a minimum to enable the mechanic to properly utilize his time.

It is also suggested that the incoming power plug be pulled to ensure safety. It must be kept in mind that the pinspotter performs a series of mechanical motions and electrical actions each cycle and that bodily injury may result should personnel enter the machine while power is on. When working on the pinspotter, it is also recommended that the power be turned off at adjacent machines. If machine guards were removed to work on the machines, they must be replaced. Do not operate machines unless all guards are in position and fastened securely. It is also a good practice to run or crank the sweep down to guard position in front of the machine. This will protect the maintenance man in case a ball is thrown by a careless bowler.

The master line switch or circuit breaker switches for each machine should be left on for the machine to operate and turned off when bowling is finished or when the building is left unattended overnight or at other times.

To sum up, the *AMF Automatic Pinspotter* requires a minimum of preventive maintenance to provide trouble-free operation. To provide the proprietor's maintenance men with a form to be used to record this operation, the AMF Preventive Maintenance Chart has been formulated. This form also provides for a tabulation of parts replaced during the preventive maintenance so that the spare parts inventory can readily be maintained.

MACHINE CLEANING

The AMF Automatic Pinspotter must be kept clean at all times to give satisfactory service to the bowler. It is of utmost importance to start off with cleanliness and to maintain the cleaning schedule given below.

Every Two Weeks:

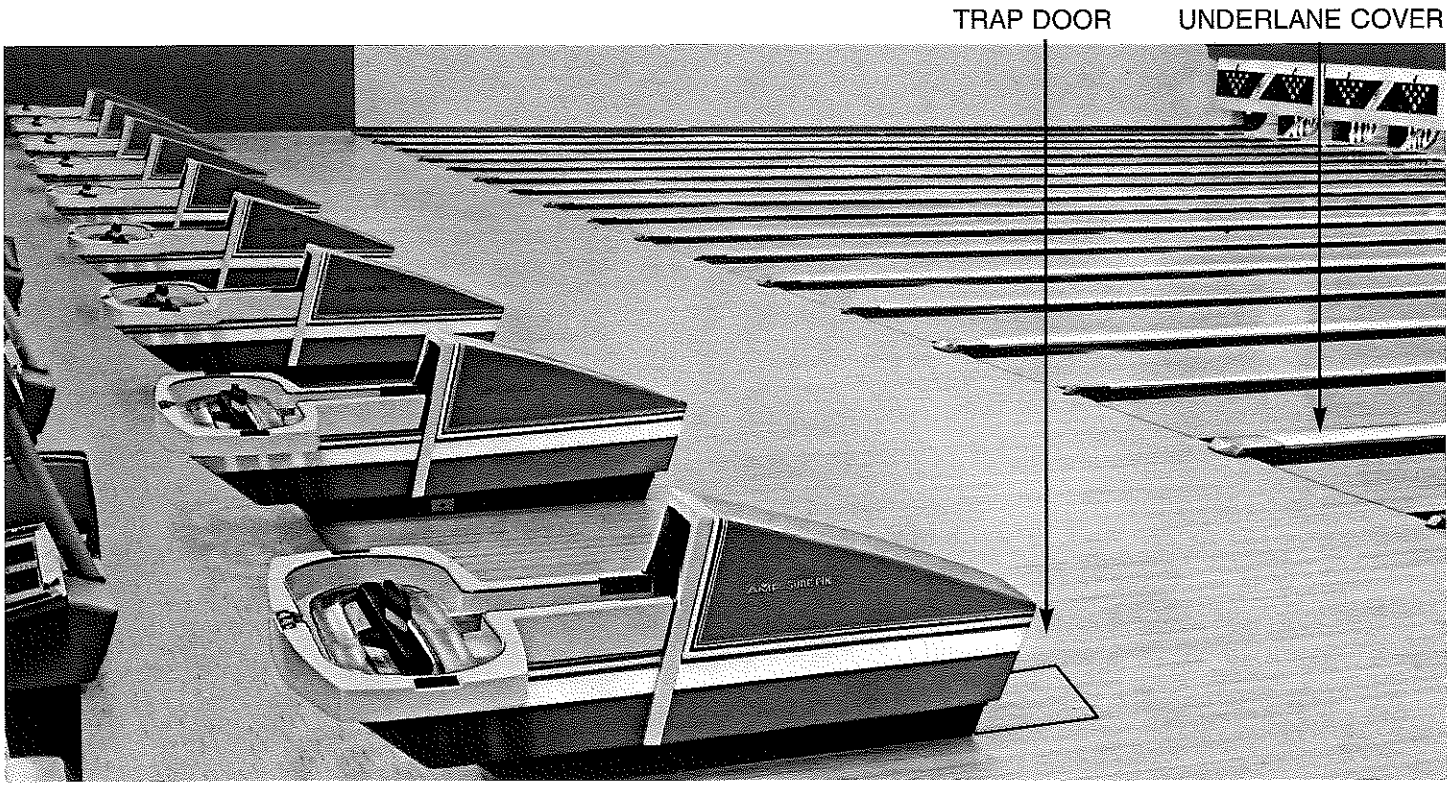
1. Dust the complete machine.

Twice A Week:

1. Wipe the following with a cloth dampened with AMFlite II Pin Cleaner, or similar substance:
   A. Inside of pin elevator wheel
   B. Inside of spotting cups and bins
   C. Pit carpet
   D. Pin curtain face
   E. Distributor belts and orienter
   F. Ball lift vertical track
   G. Sheaves and V-belt drives
2. Check motor drip pans and clean as required.
3. Reverse or change ball wipe cloths.
4. Vacuum between kickback plates and bottom section of ball lifts.
5. Vacuum under pin elevator wheel and carpet.
6. Clean ball lift belt.

UNDERLANE BALL CALL

A ball that fails to come up the ball return may be trapped in the underlane directly in front of the ball return. A trap door is provided in the approach in front of each ball return for ball removal. It is also possible the ball may not have rolled this far and is somewhere on the underlane track. The underlane cover can be raised until the ball is located. The ball must be moved to an area of sufficient width to permit it to be removed. Extreme caution must be used when working in the underlane area. The underlane and ball return serve two pinspotters. We must be certain there is no possibility of another ball using the underlane while we are working there.



AMF BOWLING, INC. TRAINING SCHOOL
DICTIONARY OF BOWLING TERMS

BALL PATH - THE LINE OF MOVEMENT OR COURSE TAKEN BY A BOWLING BALL AS IT CROSSES THE PIN DECK.

CAM - A MOVING PART, IRREGULAR SHAPED, OPERATES LEVERS OR CONTROL MECHANISMS.

CALL SHEET - A RECORD OF MACHINE TROUBLE CALLS.

CAPACITOR - AN ELECTRONIC COMPONENT WHICH HAS THE ABILITY TO PASS A.C. AND BLOCK D.C. ALSO HAS THE ABILITY TO HOLD AN ELECTRICAL CHARGE.

CHASSIS - A METAL ENCLOSURE WHERE ELECTRICAL OR MECHANICAL PARTS ARE CONTAINED WITHIN ITSELF. THE PINSPOTTER CONTROLLER.

CIRCUIT - AN ELECTRONIC PATH BETWEEN TWO OR MORE POINTS CAPABLE OF CARRYING CURRENT.

CIRCUIT BREAKER - A PROTECTION DEVICE FOR ELECTRICAL CIRCUITS. WHEN AN OVERLOAD OCCURS, THE CIRCUIT BREAKER OPENS, PROTECTING THE CIRCUIT. SOME MUST BE RESET MANUALLY.

COMPUTER - A DEVICE CAPABLE OF PERFORMING SEQUENCES OF ARITHMETIC AND LOGICAL OPERATIONS FROM A STORED PROGRAM.

CONNECTOR - A COUPLING DEVICE, PLUG OR RECEPTACLE WHICH CAN BE EASILY JOINED TO OR SEPARATED FROM ITS MATE.

CURTAIN WALL - THE WALL IN FRONT OF AND ABOVE THE PINSPOTTER.

DEADWOOD - PINS IN THE CHANNEL OR ON THE DECK THAT ARE NOT STANDING.

DECK - THE AREA AT THE PINSPOTTER END OF THE LANE WHERE PINS STAND.

EDGE CONNECTOR - A MULTIPLE CONTACT RECEPTACLE WHICH CAN BE EASILY JOINED TO OR SEPARATED FROM ITS MATE. WHAT CIRCUIT BOARDS PLUG INTO.

FUSE - A PROTECTION DEVICE FOR ELECTRIC EQUIPMENT.

GROUND - WHEN A WIRE IN A CIRCUIT MAKES CONTACT WITH A METAL RETURN TO GROUND. SUCH AS THE MACHINE FRAME.

INSTRUCT-O-MAT - MACHINE RUNS - RETURNS BALLS- BUT DOES NOT CYCLE - SAME AS PRACTICE PLAY.

JUNCTION BOX	- A POINT WHERE ELECTRICAL CONNECTIONS ARE MADE.
KLIXON	- SAME AS CIRCUIT BREAKER.
LOW VOLTAGE CIRCUITS	- A CIRCUIT IN WHICH VOLTAGE BELOW 115 VOLTS ARE USED. MOST PINSPOTTER CONTROL CIRCUITS ARE LOW VOLTAGE.
MICRO SWITCH	- A SNAP ACTION SWITCH WHICH IS SENSITIVE TO ACTUATION.
MOTHER BOARD	- A PIECE OF INSULATING MATERIAL ON WHICH COMPONENTS OR CIRCUIT BOARDS CAN BE MOUNTED.
MP (MICRO-PROCESSOR)	- A COMPUTER WHICH FUNCTIONS AS A CENTRAL PROCESSOR FOR EXECUTING INSTRUCTIONS. A VOLATILE MEMORY FOR STORING DATA AND AN INTERFACE UNIT THROUGH WHICH INSTRUCTIONS ARE TRANSMITTED.
OFFSPOT	- A PIN NOT ON THE PIN SPOT OF THE DECK OR SAME AS OUT OF RANGE.
OUT OF RANGE	- A PIN THAT HAS BEEN MOVED BEYOND THE RANGE OF A RESPOT CELL BY THE BALL OR OTHER PINS.
PHOTO ELECTRIC CELL	- A LIGHT SENSITIVE DEVICE WHICH PRODUCES CHANGES IN VOLTAGE WITH CORRESPONDING CHANGES IN LIGHT.
PINDICATION	- LIGHTS ON THE MASK OR MONITOR USED TO INDICATE PINS LEFT STANDING AFTER FIRST BALL.
PIN HOOK	- A LONG ROD WITH A FORKED END USED TO MOVE PINS FROM OR ONTO THE PIN DECK.
PINSPOTTER	- AN ELECTRO - MECHANICAL DEVICE USED TO SPOT AND RESPOT PINS IN THE GAME OF BOWLING.
PIT	- THE AREA OF THE PINSPOTTER WHERE THE CARPET IS.
POWER CORD	- A CABLE THAT CARRIES POWER TO AN ELECTRICAL LOAD.
POWER PLUG	- SAME AS CONNECTOR.
PRACTICE PLAY	- MACHINE RUNS - RETURNS BALL - BUT DOES NOT CYCLE - SAME AS INSTRUCT-O-MAT.
PRINTED CIRCUIT	- A CIRCUIT IN WHICH THE INTER-CONNECTING WIRES HAVE BEEN REPLACED BY CONDUCTIVE STRIPS PRINTED OR ETCHED ONTO AN INSULATING BOARD.

PUSH BUTTON SWITCH	- A SWITCH MOMENTARILY OPERATED.
RELAY	- AN ELECTROMAGNETIC DEVICE WHICH CONTROLS A FLOW OF CURRENT IN ONE CIRCUIT BY MEANS OF A LESSER CURRENT IN ANOTHER CIRCUIT. AN ELECTRONICALLY OPERATED SWITCH.
RUSSELL STOLL	-NAME APPLIED TO THE PINSPOTTER POWER PLUG.
SCHEMATIC DIAGRAM	- A DRAWING WHICH SHOWS THE ELECTRICAL CONNECTIONS IN A CIRCUIT.
SHADOW BOWL	- SAME AS INSTRUCT-O-MAT.
SOLENOID	- AN ELECTRO-MAGNET HAVING A MOVABLE IRON CORE.
SPAREMAKER	- AN ELECTRONIC DEVICE USED TO HELP A BOWLER DIRECT HIS SECOND BALL TO HAVE THE MAXIMUM CHANCE OF EFFECTING A SPARE. BALL PLACEMENT IS INDICATED BY A LIGHTED ARROW ON THE MASKING UNIT OR MONITOR.
SWITCH	- A MECHANICAL OR ELECTRICAL DEVICE THAT COMPLETES OR BREAKS THE PATH OF CURRENT.
SYMBOL	- A DESIGN WHICH INDICATES AN ELECTRONIC OR ELECTRICAL PART.
TERMINAL	- A SPRING TYPE METAL CLIP WHICH IS CLAMPED ON THE END OF A WIRE. PERMITS ELECTRICAL CONNECTION TO BE MADE WITHOUT THE USE OF SOLDER.
TIME DELAY	- THE ELAPSED TIME REQUIRED FOR RESULTS TO BE SEEN AFTER A COMMAND IS GIVEN.
TRANSFORMER	- A DEVICE WHICH STEPS UP OR REDUCES THE AVAILABLE LINE VOLTAGE.

GENUINE
AMF
PARTS